1509 Main Street, Suite 900
Dallas, Texas
75201-4809

214/744-1641

# ICF TECHNOLOGY INCORPORATED

X-Ref SA Vol #1

TO: Ed Sierra, EPA Region VI, RPO

THRU: K. H. Malone, Jr., FITOM

THRU: Debra R. Pandak, AFITOM

FROM: Warren P. Mitchell, FIT Biologist CAC for W.P.M. TDD: F-06-8908-48

DATE: November 16, 1990 PAN: FTX1013HAA

SUBJ: rHRS PreScore Analysis
Dixie Chemical Company, Pasadena, Harris County, Texas
TXD008088247

The FIT was tasked to complete a revised Hazard Ranking System (rHRS) Prescore Analysis for the Dixie Chemical Company, an Environmental Priorities Initiative site, located in Pasadena, Harris County, Texas. The site geographic coordinates are 29°36'43" north latitude and 95°03'02" west longitude (Figure 1) (Ref. 6, p. 7). The site is located in an unincorporated portion of Pasadena, called the Bayport Industrial District. This portion was de-annexed solely for the industrial chemical plants that exist in the district. Dixie Chemical Company covers approximately 22 acres. The site is bisected by a stormwater discharge canal (Figure 2) (Ref. 3, p. 3). The Technical Directive Document (TDD) also requested a list and description of the Solid Waste Management Units (SWMUs) at the site and the net worth of and the recent annual sales figures for the company that owns the facility. The site was evaluated under the February 15, 1990 edition of the rHRS User's Manual.

Dixie Chemical Company manufactures, formulates, and packages chemicals on a demand basis. The types of chemicals being formulated or manufactured changed, depending on the market demand. About 75 percent of the plant's operations consisted of the manufacture and formulation of organic chemicals including epoxy compounds, glycidol and various glycols. Various other inorganic and organic chemicals accounted for about 15 percent of the production. The remaining 10 percent involved the formulation and wholesaling of drill muds and other oil field chemicals (Ref. 3, p. 3).

The manufacturing facility is divided into two segments, Plant A and Plant B. Plant A has seven separate manufacturing areas for the various products formulated. Plant B is exclusively devoted to the formulation of stearified dibasic acid. Each production stage generates waste by-products and wastewater from cooling, rinsing and processing. Dry waste chemicals and waste sludges are pumped to one of the six tanks on the property in Plant A. The majority of the wastes generated at the site are generated in Plant B and stored in SWMU 16. This is the only tank on the facility which is exclusive to the storage of waste materials (Ref. 3, p. 3). Wastewater and stormwater is transferred to sumps located in and around the process areas. In the Plant A area, wastewater is neutralized in SWMU #6, the Equalization Neutralization Facility (ENF), then pumped to the North and South Aeration Basins (SWMU #10). From here the discharge is released under permit to the Gulf Coast Waste Management Authority (GCWMA) Industrial Wastewater Treatment Plant (IWTP). Stormwater runoff from each of the process areas is collected in unlined ditches that flow to sumps (SWMUs #4 and #5). This water is then pumped to SWMU #6, thus entering the cycle of the wastewater treatment system (Ref. 3, pp. 5-9).

In the Plant B area, wastewater and stormwater are collected in sumps, SWMU #2, pumped to the Equalization Basin (SWMU #8), then to the Impoundment Basin (SWMU #9). No treatment takes place in either of these units. The wastewaters are pumped to the North and South Aeration Basins (SWMU #10). The stormwater runoff from the Plant B area enters the West Sump and Ditch (SWMU #3) and is then pumped to the Equalization Basin (Ref. 3, p. 9). Analysis of soil samples collected by A.T. Kearney detected trichloroethene at high concentrations in the soil. Also, a Comprehensive Monitoring Evaluation report by the Texas Water Commission (TWC) indicated that epichlorohydrin, trans-1,2 dichloroethylene and trichloroethylene were found to be at high concentrations in ground water monitoring well 3 (Ref. 3, p. 13).

The pathways of concern are the air pathway and the ground water. The North and South Aeration Basins handle aerated organic constituents and therefore pose a high potential for release of hazardous constituents to the air.

There are six public supply wells within the 4 mile radius of the site. These wells service approximately 42,000 people.

The Beaumont Formation which underlies the Dixie Chemical facility consists of an 80 feet deep layer of clay. Two major aquifers occur in this area, the Chicot and the Evangeline aquifers. The Chicot is the upper regional unit, consisting of sands and silty sands and is approximately 600 feet in depth. The second sand unit, the Evangeline aquifer, lies below the Chicot and is approximately 3,800 feet in depth. Shallow ground water has been encountered at 5-13 feet below the ground surface at the site. This shallow ground water is a red clay of varying thickness; therefore, the two major aquifers are not interconnected with the shallow aquifer (Ref. 3, p. 11).

The surface water pathway is not a pathway of concern because drainage from the site is collected, treated and discharged to the GCWMA (Ref. 3, p. 11). Runoff from the site is not a threat since it is controlled. There are no surface water intakes downstream of the site. The nearest surface water body is Taylor Bayou, located about 1,500 feet southeast of the site (Ref. 3, p. 13). It is used for motorized boating, swimming and water skiing (Ref. 10). The facility is in the 100 year floodplain. Since the plant's process areas are diked with earthen or oystershell berms, the surface water migration pathway is not evaluated.

The Dixie Chemical Company is a private entity, and consequently financial data concerning recent annual sales were not available for public view (Ref. 9, p. 2).

The data gaps that were encountered during the completion of the PreScore package include:

- The extent of air release by the North and South Aeration Basins.
- Possible air release occurring from the open ditches and sumps in the process area.
- It is unclear if the chemical plants upgradient to Dixie Chemical, would affect the ground water or surface water.
- No documentation has been obtained concerning any remedial action of the soil contamination.

A list and description of the SWMUs are in Attachment A (Ref. 3, pp. 16-57).

# HRS SCORING PACKAGE
# DIXIE CHEMICAL (TXD008088247)
(Page 1)

WAA
12/14/90



SITE NAME: DIXIE CHEMICAL COMPANY PREPARER: Warren P. Mitchell

LOCATION: PASADENA, TEXAS

## 1. GENERAL COMMENTS / OBSERVATIONS

Sources

Dixie Chemical Company engaged in the manufacturing, formulating, and packing of chemicals on a demand basis. The facility covers 22 acres and is bisected into Plants A and B by a stormwater discharge canal (Ref. 3, p. 3).

Each production process generates waste by-products and wastewater through cooling, rinsewater, and process water. There are 41 Solid Waste Management Units (SWMUs) at the facility (Ref. 3, pp. 16-57) (Figures 2 and 3). Ponds A and B (SWMU #7) have been clean-closed (Ref. 4, pp. 6-12).

The majority of waste at the facility is generated in the Plant B area, and is stored in SWMU #16. There are five other SWMUs (tanks) which are used interchangeably for waste storage. Dry waste chemicals and waste sludges are pumped to SWMU #16. Wastewater and stormwater are transferred to sumps in SWMUs #1 and #2 (Ref. 3, p. 5).

In Plant A, wastewater enters SWMU #6 where neutralization takes place. The neutralized water is then pumped to SWMU #10 where microbial degradation occurs. The waste material is then discharged to the Gulf Coast Waste Management Authority and the Industrial Waste Treatment Plant. Stormwater runoff from the process areas of Plant A are collected in ditches which flow to SWMUs #4 and #5. The wastewater is then pumped to SWMU #6 and thereby enters the wastewater treatment cycle (Ref. 3, pp. 5 and 9).

In the Plant B area, wastewater and stromwater are collected in SWMU #2, pumped to SWMU #8 and then to SWMU #9. The wastewaters are then pumped to SWMU #10. Stormwater runoff from the process areas of Plant B enters SWMU #3 and is then pumped to SWMU #8 and thereby enters the wastewater treatment cycle (Ref. 3, p. 9).

There are other areas at the facility where wastes are managed. The following list of SWMUs were evaluated based on the potential to release and the wastes managed. The remaining SWMUs on-site pose little threat; therefore, these SWMUs will not be evaluated.

Hazardous Waste Quantity

Hazardous Wastestream

1) SWMU #3 - West Sump and Ditch receives stormwater and process wastewater from Plant B (Ref. 3, pp. 20-21).

- Ditch:

Assumed length: 600 feet (Ref. 5, Figure 1)

$3\ ft \times 2\ ft \times 600\ ft = 3{,}600\ ft^3$

$3{,}600\ ft^3 \times \frac{1\ yd^3}{27\ ft^3} = 133.3\ yd^3$

$\frac{133.3}{2.5^*} = \underline{\underline{53.3}}$

- West Sump:

$3\ ft \times 2\ ft \times 3\ ft = 18\ ft^3$

$18\ ft^3 \times \frac{1\ yd^3}{27\ ft^3} = 0.667\ yd^3$

$\frac{0.667}{2.5^*} = \underline{\underline{0.267}}$

Sum = $53.3 + 0.267 = \underline{\underline{53.57}}$

2) SWMU #4 - Area 100 South Ditch (Ref. 3, pp. 22-23)

Assumed length: 600 feet (Ref. 5, Figure 1)

$3\ ft \times 1\ ft \times 600\ ft = 1{,}800\ ft^3$

$1{,}800\ ft^3 \times \frac{1\ yd^3}{27\ ft^3} = 66.67\ yd^3$

$\frac{66.67}{2.5^*} = \underline{\underline{26.67}}$

3) SWMU #5 - Area 300/400 North Ditch (Ref. 3, pp. 24-25)

Assumed length: 600 feet (Ref. 5, Figure 1)

$$3 \text{ ft} \times 1 \text{ ft} \times 600 \text{ ft} = 1{,}800 \text{ ft}^3$$

$$1{,}800 \text{ ft}^3 \times \frac{1 \text{ yd}^3}{27 \text{ ft}^3} = 66.67 \text{ yd}^3$$

$$\frac{66.67}{2.5^*} = \underline{\underline{26.67}}$$

4) SWMU #10 - North and South Aeration Basins (Ref. 3, pp. 34-35)

The basins have the same dimensions:

$$125 \text{ ft} \times 250 \text{ ft} \times 12 \text{ ft} = 375{,}000 \text{ ft}^3$$

$$375{,}000 \text{ ft}^3 \times \frac{1 \text{ yd}^3}{27 \text{ ft}^3} = 13{,}888.89 \text{ yd}^3$$

$$\frac{13{,}888.89}{2.5^*} = \underline{\underline{5{,}555.6}}$$

$$\text{Sum} = 5{,}555.6 + 5{,}555.6 = \underline{\underline{11{,}111.2}}$$

5) SWMU #16 - Tank T-335 (Ref. 3, pp. 44-45)

$$10{,}000 \text{ gal} \times \frac{2{,}000 \text{ lbs}}{200 \text{ gal}} = 100{,}000 \text{ lbs}$$

$$\frac{\text{yd}^3}{2{,}000 \text{ lbs}} = \frac{x \text{ yd}^3}{100{,}000 \text{ lbs}} = 50 \text{ yd}^3$$

$$\frac{50}{2.5^*} = \underline{\underline{20}}$$

For additional information concerning the SWMUs, see Attachment A.

# HRS SCORING PACKAGE
# DIXIE CHEMICAL (TXD008088247)


Hazardous Waste Quantity:

| | |
|---|---|
| SWMU #3 | 53.57 |
| SWMU #4 | 26.67 |
| SWMU #5 | 26.67 |
| SWMU #10 | 11,111.20 |
| SWMU #16 | + 20.00 |
| Sum = | 11,238.11 |

* Ref. 1, Table 2-5, Sec. 2.4.2.1.1.

ASSIGNED VALUE = 10,000 (Ref. 1, Sec. 2.4.2.2)

# HRS SCORING PACKAGE
# DIXIE CHEMICAL (TXD008088247)


## II. UNRESOLVED ISSUES OR ASSUMPTIONS

### 1. Soil Pathway

- No documentation exists of any contaminated areas to support the resource factor.

- There is no documentation of terrestial sensitive environments at the site.

### 2. Hazardous Waste Quantity

- The length of SWMUs 3 and 4 are estimated at 600 feet by using Reference 5, Figure 1.

III. GROUND WATER PATHWAY

1. **Ground Water Pathway:** Chemical analysis of ground water in monitoring well-3, located east of Ponds A & B, detected the following compounds and concentrations: trichloroethylene (TCE) at 22 to 72 ppm and trans-1,2 dichloroethylene at 58 to 93 ppm. (Ref. 3, p. 13). Background levels of 0.005 ppm was established from EPA secondary drinking water standards for TCE and trans-1,2-dichloroethylene. Due to this information, an observed release to the ground water pathway is established.
**ASSIGNED VALUE = 550** (Ref. 1, Sec. 3.1.1)

4. **Toxicity / Mobility:** Analysis of monitoring well samples taken at the site detected the following contaminants:

| CONTAMINANT | TOXICITY | GROUND WATER MOBILITY | TOXICITY / MOBILITY |
|---|---|---|---|
| vinyl chloride | 10,000 | 0.2 | 2,000 |
| trans-1,2 dichloroethylene | 1 | 0 | 0 |
| trichloroethylene | 10 | 1 | 10 |

(Ref. 1, Chemical Data Sheets, Table 3-9, Sec. 3.2.1; Ref. 2, pp. 35-36; Ref. 3, p. 13; Ref. 4, p. 12).
Highest value for Toxicity/Mobility = 2,000
**ASSIGNED VALUE** = 2,000 (Ref. 1, Sec. 3.2.1.3).

7. **Nearest Well:** The nearest known water well is approximately 2.5 miles southeast of the site (Ref. 14, p. 169, Figure 1)
**ASSIGNED VALUE** = 3 (Ref. 1, Sec. 3.3.1)

8. **Population:**

8a. **Population (Level I Concentration):** There are no samples that establish an observed release from a point of withdrawal to the ground water subject to Level I Concentrations; therefore, no Level I Concentrations can be calculated.
**ASSIGNED VALUE** = 0 (Ref. 1, Sec. 3.3.2.2)

8b. **Population (Level II Concentration):** There are no samples that establish an observed release from a point of withdrawal to the ground water subject to Level II Concentrations; therefore, no Level II Concentrations can be calculated.
**ASSIGNED VALUE = 0** (Ref. 1, Sec. 3.3.2.3)

8c. **Potential Population:** Clear Lake City services approximately 42,000 people with 90% from surface water and about 10% from ground water; therefore, only 10% of the 42,000 people serviced, or 4,200, people will be evaluated.

| Distance From Source (miles) | Number of Individuals | Dilution Weighted Factor |
|---|---|---|
| 0 - ¼ | 0 | 0 |
| ¼ - ½ | 0 | 0 |
| ½ - 1 | 0 | 0 |
| 1 - 2 | 0 | 0 |
| 2 - 3 | 4,200 | 678 |
| 3 - 4 | 0 | 0 |
| | Sum | 678 |

(Ref. 1, Table 3-12, Sec. 3.3.2.4; Ref. 15).

PC = (0.10) (678)
= 67.8

**ASSIGNED VALUE = 67.8** (Ref. 1, Sec. 3.3.2.4)

9. **Resources:** Clear Lake City has six municipal wells within the target distance limit (Ref. 15).
**ASSIGNED VALUE = 5** (Ref. 1, Sec. 3.3.3)

10. **Wellhead Protection Area:** Clear Lake City has six municipal wells within the target distance limit (Ref. 15). Due to this information, Clear Lake City is in a wellhead protection area.
**ASSIGNED VALUE = 20** (Ref. 1, Sec. 3.3.4)

## IV. SURFACE WATER PATHWAY

**Observed Release:** The facility's process areas are diked with earthen berms enclosing all Solid Waste Management Units. All process areas at the facility drain via ditches and sumps, which eventually are run through the facility's wastewater treatment system. No portion of the facility is known to lie in the 100 year floodplain due to the extensive diking around the stormwater canal (Ref. 3, p. 11).

Located southeast of the facility is a privately operated industrial wastewater treatment plant. Gulf Coast Waste Management Authority (GCWMA) is responsible for the water that is discharged to Taylor Bayou. Taylor Bayou is approximately 1,500 feet southeast of the facility (Ref. 3, p. 13).

Due to the facility's release of its wastewater to GCWMA, and extensive diking and berms, it poses little threat to surface water. Due to this information, the surface water pathway will not be evaluated.

## GROUND WATER TO SURFACE WATER MIGRATION COMPONENT

The nearest surface water body is Taylor Bayou, located approximately 1,500 feet southeast of the facility (Ref. 3, p. 13). The maximum depth of Taylor Bayou is 2 - 3 feet deep (Ref. 8). Ground water is encountered at 5 - 13 feet below land surface (Ref. 3, p. 11; Ref. 4, p. 3). The requirements for the ground water to surface water pathway are not met; therefore, the pathway will not be evaluated.

V. SOIL EXPOSURE PATHWAY

1. **Likelihood of Exposure:** Soil samples were obtained from the west end of Solid Waste Management Unit #4 (Ref. 2, pp. 6, 7 and 35). Analysis of soil sample 278 detected levels of trichloroethene at 0.850 ppm (Ref. 2, p. 27). Background soil sample 275 detected trichloroethene at 0.0062 ppm (Ref. 2, p. 15). Due to this information, an observed release to the soil is established.
**ASSIGNED VALUE** = 550 (Ref. 1, Sec. 5.1.1)

2. **Toxicity:** Analysis of soil samples taken at the site detected the following contaminants:

| CONTAMINANT | TOXICITY |
|---|---|
| trichloroethene | 10 |

(Ref. 1, Chemical Data Sheets, Table 3-9, Sec. 3.2.1; Ref. 2, pp. 35-36; Ref. 3, p. 13)
Highest value for toxicity = 10
**ASSIGNED VALUE** = 10 (Ref. 1, Sec. 5.1.2.1)

5. **Resident Individual:** There are no persons that meet the requirements for a resident individual (Ref. 11).
**ASSIGNED VALUE** = 0 (Ref. 1, Sec. 5.1.3.1)

6c. **Resident Population:**

**Level I Concentrations:** There are no residential individuals subject to Level I Concentrations.
**ASSIGNED VALUE** = 0 (Ref. 1, Sec. 5.1.3.2.1)

**Level II Concentration:** There are no residential individuals subject to Level II Concentrations.
**ASSIGNED VALUE** = 0 (Ref. 1, Sec. 5.1.3.2.2)

7. **Workers:** Dixie Chemical employees approximately 130 people (Ref. 1, Table 5-4, Sec. 5.1.3.3; Ref. 12).
**ASSIGNED VALUE** = 5 (Ref. 1, Sec. 5.1.3.3)

8. **Resources:** There is no documentation of commercial agriculture, commercial silviculture, and commercial livestock production or grazing at the Dixie Chemical site.
**ASSIGNED VALUE** = 0 (Ref. 1, Sec. 5.1.3.4)

9. **Terrestrial Sensitive Environments:** There is no documentation of terrestrial sensitive environments at the site.
**ASSIGNED VALUE** = 0 (Ref. 1, Sec. 5.1.3.5)

**PROJECTED**

9. **Terrestrial Sensitive Environments:** The following is a list of endangered/threathened species known to exist within the county area and not specific to the site.

| Sensitive Environment | Assigned Value |
|---|---|
| Bald Eagle | 75 |
| Least Interior Tern | 75 |
| Piping Plover | 75 |
| Whooping Crane | 100 |
| American Alligator | 75 |
| Sum | 400 |

(Ref. 1, Table 4-13 Sec. 4.1.4.3.1.3; Table 6-7, Sec. 6.3.4.2; Ref. 17)

EP = (0.10) (400) = 40

**ASSIGNED VALUE** = 40 (Ref. 1, Sec. 5.1.3.5)

12. **Attractiveness / Accessibility:** The site area is fenced, and is assigned a value of 5 (Ref. 1, Table 5-6, Sec. 5.2.1.1; Ref. 16).
**ASSIGNED VALUE** = 5 (Ref. 1, Sec. 5.2.1.1)

13. **Area of Contamination:** The area 100 South Ditch is 3 feet wide and approximately 600 feet long (Ref. 3, p. 22). The total area of contamination is approximately 1,800 $ft^2$.
1,800 $ft^2$: Factor Value = 0
(Ref. 1, Table 5-7, Sec. 5.2.1.2)
**ASSIGNED VALUE** = 0 (Ref. 1, Sec. 5.2.1.2)

15. **Toxicity**: Analysis of soil samples taken at the site detected the following contaminants:

| CONTAMINANT | TOXICITY |
|---|---|
| trichloroethene | 10 |

(Ref. 1, Chemical Data Sheets, Table 3-9, Sec. 3.2.1; Sec. 5.1.2.1; Ref. 2, pp. 35-36; Ref. 3, p. 13)
Highest value for toxicity = 10
**ASSIGNED VALUE = 10** (Ref. 1, Sec. 5.2.2.1)

18. **Nearby Individual**: The nearest residence is approximately 2.5 miles from the site (Ref. 1, Table 5-9, Sec. 5.2.3.1; Ref. 13).
**ASSIGNED VALUE = 0** (Ref. 1, Sec. 5.2.3.1)

19. **Population Within 1 Mile**: Using U.S.G.S. topographic maps, a house count was performed for those individuals within a 1 mile radius. There are no residents or students within 1 mile of the site (Ref. 13).
**ASSIGNED VALUE = 0** (Ref. 1, Sec. 5.2.3.2)

VI. AIR PATHWAY

1. **Observed Release**: There is no documentation that will establish an observed release to the air.
ASSIGNED VALUE = 0 (Ref. 1, Sec. 6.1.1)

2. **Potential to Release**:

2a. **Gas Potential to Release**
Gas Containment: SWMU #4 is an unlined ditch surrounded by 3 feet high earthen and concrete berms (Ref. 3, p. 22).
- All situations except those specifically listed below (Ref. 1, Table 6-3, Sec. 6.1.2.1.1)

ASSIGNED VALUE = 10 (Ref. 1, Sec. 6.1.2.1.1)

Source Type: SWMU #4 has contaminated soil [excluding land treatment] (Ref.1, Table 6-4, Sec. 6.1.2.1.2).
ASSIGNED VALUE = 19 (Ref. 1, Sec. 6.1.2.1.2)

Gas Migration Potential
- The gas migration potential for the sources, trans-1,2-dichloroethylene and trichloroethene are 11 and 17 respectively. Average gas migration potential is 14. (Ref. 1, Chemical Data Sheets; Ref. 2, pp. 7, 27).

ASSIGNED VALUE = 14 (Ref. 1, Sec. 6.1.2.1.3)

$$19 + 14 = 33$$
$$33 \times 10 = 330$$

ASSIGNED VALUE = 330 (Ref. 1, Sec. 6.1.2.1.4)

2b. **Particulate Potential to Release**
Particulate Containment: SWMU #4 is an unlined ditch surrounded by 3 feet high earthen and concrete berms (Ref. 3, p. 22).
- All situations except those specifically listed below (Ref. 1, Table 6-9, Sec. 6.1.2.2.1)

ASSIGNED VALUE = 7 (Ref. 1, Sec. 6.1.2.2.1)

Particualate Source Type: SWMU #4 has contaminated soil [excluding land treatment] (Ref. 3, p. 22).
- Other types of sources, not elsewhere specified, best describes the source (Ref. 1, Table 6-4, Sec. 6.1.2.1.2)

ASSIGNED VALUE = 0 (Ref. 1, Sec. 6.1.2.2.2)

Particulate Migration Potential:

- The particulate migration potential for the sources trans-1,2-dichloroethylene and trichloroethene are 11 for each contaminant (Ref. 1, Sec. 6.1.2.2.3, Figure 6-2).

**ASSIGNED VALUE = 11** (Ref. 1, Sec. 6.1.2.2.3)

0 + 11 = 11
11 x 7 = 77
**ASSIGNED VALUE = 77** (Ref. 1, Sec. 6.1.2.2.4)

4. **Toxicity / Mobility**: The same contaminants evaluated for the Gas Migration Potential will be evaluated for Toxicity/Mobility:

| Contaminant | Toxicity | Mobility | Toxicity/Mobility |
|---|---|---|---|
| trans-1,2 dichloroethylene | 1 | 0.008 | 0.008 |
| trichloroethene | 10 | 0.008 | 0.08 |

(Ref. 1, Chemical Data Sheets, Table 3-9, Sec. 3.2.1; Figure 6-3, Sec. 6.2.1.2; Table 6-12, Sec. 6.2.1.3; Ref. 2, pp. 7, 27; Ref. 3, p. 13)
Highest value for toxicity = 0.008
**ASSIGNED VALUE = 0.008** (Ref. 1, Sec. 6.2.1.3)

7. **Nearest Individual**: The shortest distance to a regularly occupied building or area is approximately ⅛ mile from the site (Ref. 1, Table 6-15, Sec. 6.3.1; Ref. 13, Figure 1).
**ASSIGNED VALUE = 20** (Ref. 1, Sec. 6.3.1)

8. **Population**:

8a. **Level I Concentrations**: No observed release to the air pathway has been established; therefore, no Level I Concentrations can be evaluated.
**ASSIGNED VALUE = 0** (Ref. 1, Sec. 6.3.2.2)

8b. **Level II Concentrations**: No observed release to the air pathway has been established; therefore, no Level II Concentrations can be evaluated.
**ASSIGNED VALUE = 0** (Ref. 1, Sec. 6.3.2.3)

8c. Potential Contamination: A house count using U.S.G.S topographic maps was performed to determine the number of potential air targets.

| Distance | Number of Homes | Population Density | Population | Distance-Weighted Population |
|---|---|---|---|---|
| 0 - ¼ | 0 | 2.67 | 0 | 0 |
| ¼ - ½ | 0 | 2.67 | 0 | 0 |
| ½ - 1 | 0 | 2.67 | 0 | 0 |
| 1 - 2 | 1,120 | 2.67 | 2,990.4 | 8 |
| 2 - 3 | 2,316 | 2.67 | 6,183.72 | 12 |
| 3 - 4 | 2,576 | 2.67 | 6,877.92 | 7 |
| | | | Sum = | 27 |

(Ref. 1, Table 6-16, Sec. 6.3.2.4; Ref. 13; Ref. 16)
PI = (0.10) (27) = 2.7

ASSIGNED VALUE = 2.7 (Ref. 1, Sec. 6.3.2.4)

9. Resources: Taylor Bayou is designated for recreational use, and is within ½ mile of the site (Ref. 1, Sec. 6.3.3; Ref. 10; Ref. 13)
ASSIGNED VALUE = 5 (Ref. 1, Sec. 6.3.3)

10. Sensitive Environments:

10a. Actual Contamination: There are no sensitive environments that are subject to actual contamination.
ASSIGNED VALUE = 0 (Ref. 1, Sec. 6.3.4.1)

PRELIMINARY

10b. **Potential Contamination:** The following is a list of sensitive environments found within the 4 mile target distance limit:

| Sensitive Environment | Assigned Value | Distance (miles) | Distance Weights | Assigned Value x Distance Weight |
|---|---|---|---|---|
| National Estuary Program: Armound Bayou National Park | 100 | 3 | 0.0023 | 0.23 |
| Taylor Bayou | 50 | 1 | 0.016 | 0.8 |
| Taylor Lake | 50 | 2 | 0.0051 | 0.255 |
| Clear Lake | 25 | 4 | 0.0014 | 0.035 |
| | | | Sum | 1.32 |

(Ref. 1, Table 4-13, Sec. 4.1.4.3.1.3; Table 6-14, Sec. 6.3.4.2; Ref. 7; Ref. 9).

EP = (0.10) (1.32) = 0.132

**ASSIGNED VALUE = 0.132** (Ref. 1, Sec. 6.3.4.2)

PROJECTED

10b. **Potential Contamination:** The following is a list of sensitive environments found within the 4 mile target distance limit:

| Sensitive Environment | Assigned Value | Distance (miles) | Distance Weights | Assigned Value x Distance Weight |
|---|---|---|---|---|
| National Estuary Program: Armound Bayou National Park | 100 | 3 | 0.0023 | 0.23 |
| Taylor Bayou | 50 | 1 | 0.016 | 0.8 |
| Taylor Lake | 50 | 2 | 0.0051 | 0.255 |
| Clear Lake | 25 | 4 | 0.0014 | 0.035 |
| Bald Eagle | 75 | DNA* | DNA | 75 |
| Least Interior Tern | 75 | DNA | DNA | 75 |
| Piping Plover | 75 | DNA | DNA | 75 |
| Whooping Crane | 100 | DNA | DNA | 100 |
| American Alligator | 75 | DNA | DNA | 75 |
| | | | Sum | 401.32 |

(Ref. 1, Table 4-13, Sec. 4.1.4.3.1.3; Table 6-14, Sec. 6.3.4.2; Ref. 7; Ref. 9)

DNA* Does Not Apply

EP = (0.10) (401.32) = 40.132

**ASSIGNED VALUE** = 40.132 (Ref. 1, Sec. 6.3.4.2)

## SSI PRESCORE SCORESHEETS
## SUMMARY SCORESHEET FOR COMPUTING $S_M$

### PRELIMINARY HRS SCORE
### DRAFT

| | S PATHWAY | $S^2$ PATHWAY |
|---|---|---|
| Ground Water Migration Pathway Score ($S_{gw}$) | 35.77 | 1,279.49 |
| Surface Water Overland/Flood Migration Pathway Score ($S_{of}$) | NOT EVALUATED | NOT EVALUATED |
| Ground Water to Surface Water Migration Pathway Score ($S_{gs}$) | NOT EVALUATED | NOT EVALUATED |
| Soil Exposure Migration Pathway Score ($S_s$) | 0.6 | 0.36 |
| Air Migration Pathway Score ($S_s$) | 0.334 | 0.11156 |
| $S^2_a + S^2_{gw} + (S^2_{of} \text{ or } S^2_{gs}) + S^2_s$ | | 1,279.97 |
| $[S^2_a + S^2_{gw} + (S^2_{of} \text{ or } S^2_{gs}) + S^2_s] / 4$ | | 319.99 |
| $\sqrt{[S^2_a + S^2_{gw} + (S^2_{of} \text{ or } S^2_{gs}) + S^2_s]/4}$ | | 17.89 |

### PROJECTED HRS SCORE
### DRAFT

| | S PATHWAY | $S^2$ PATHWAY |
|---|---|---|
| Ground Water Migration Pathway Score ($S_{gw}$) | 35.77 | 1,279.49 |
| Surface Water Overland/Flood Migration Pathway Score ($S_{of}$) | NOT EVALUATED | NOT EVALUATED |
| Ground Water to Surface Water Migration Pathway Score ($S_{gs}$) | NOT EVALUATED | NOT EVALUATED |
| Soil Exposure Migration Pathway Score ($S_s$) | 5.4 | 29.16 |
| Air Migration Pathway Score ($S_s$) | 0.814 | 0.663 |
| $S^2_a + S^2_{gw} + (S^2_{of} \text{ or } S^2_{gs}) + S^2_s$ | | 1,309.313 |
| $[S^2_a + S^2_{gw} + (S^2_{of} \text{ or } S^2_{gs}) + S^2_s] / 4$ | | 327.33 |
| $\sqrt{[S^2_a + S^2_{gw} + (S^2_{of} \text{ or } S^2_{gs}) + S^2_s]/4}$ | | 18.09 |

TABLE 3-1

GROUND WATER MIGRATION PATHWAY SCORESHEET
DIXIE CHEMICAL (TXD008088247); PASADENA, TEXAS - PRELIMINARY

| Factor Categories and Factors | Maximum Value | Value Assigned | |
|---|---|---|---|
| **Likelihood of Release to an Aquifer** | | | |
| 1. Observed Release | 550 | 550 | |
| 2. Potential to Release | | | |
| 2a. Containment | 10 | | |
| 2b. Net Precipitation | 10 | | |
| 2c. Depth to Aquifer | 5 | | |
| 2d. Travel Time | 35 | | |
| 2e. Potential to Release [Lines 2a x (2b + 2c + 2d)] | 500 | | |
| 3. Likelihood of Release [Higher of Lines 1 or 2e] | 550 | | 550 |
| **Waste Characteristics** | | | |
| 4. Toxicity / Mobility | * | 2,000 | |
| 5. Hazardous Waste Quantity | * | 10,000 | |
| 6. Waste Characteristics | 100 | | 56 |
| **Targets** | | | |
| 7. Nearest Well | 50 | 3 | |
| 8. Population | | | |
| 8a. Level I Concentrations | ** | 0 | |
| 8b. Level II Concentrations | ** | 0 | |
| 8c. Potential Contamination | ** | 67.8 | |
| 8d. Population (Lines 8a + 8b + 8c) | ** | 67.8 | |
| 9. Resources | 5 | 5 | |
| 10. Wellhead Protection Area | 20 | 20 | |
| 11. Targets (Lines 7 + 8d + 9 + 10) | ** | | 95.8 |
| **Ground Water Migration Score for an Aquifer** | | | |
| 12. Aquifer Score [(Lines 3 x 6 x 11)/82,500]**** | 100 | | 35.77 |
| **Ground Water Migration Pathway Score** | | | |
| 13. Pathway Score ($S_{gw}$), (Highest value from Line 12 for all aquifers evaluated)**** | 100 | | 35.77 |

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.
*** No specific maximum value applies to the factor. However, the pathway score based solely on sensitive environments is limited to a maximum of 60.
**** Do not round to the nearest integer.

2/15/90

TABLE 4-1

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORESHEET
DIXIE CHEMICAL (TXD008088247); PASADENA, TEXAS - PRELIMINARY

# NOT EVALUATED

| Factor Categories and Factors | Maximum Value | Value Assigned | |
|---|---|---|---|
| DRINKING WATER THREAT | | | |
| Likelihood of Release | | | |
| 1. Observed Release | 550 | ______ | |
| 2. Potential to Release by Overland Flow | | | |
| 2a. Containment | 10 | ______ | |
| 2b. Runoff | 25 | ______ | |
| 2c. Distance to Surface Water | 25 | ______ | |
| 2d. Potential to Release by Overland Flow [Lines 2a x (2b + 2c)] | 500 | ______ | |
| 3. Potential to Release by Flood | | | |
| 3a. Containment (Flood) | 10 | ______ | |
| 3b. Flood Frequency | 50 | ______ | |
| 3c. Potential to Release by Flood (Lines 3a x 3b) | 500 | ______ | |
| 4. Potential to Release [(Lines 2d + 3c), subject to a maximum of 500] | 500 | ______ | |
| 5. Likelihood to Release (Higher of Lines 1 or 4) | 550 | | ______ |
| Waste Characteristics | | | |
| 6. Toxicity/Persistence | * | ______ | |
| 7. Hazardous Waste Quantity | * | ______ | |
| 8. Waste Characteristics | 100 | | ______ |
| Targets | | | |
| 9. Nearest Intake | 50 | ______ | |
| 10. Population | | | |
| 10a. Level I Concentrations | ** | ______ | |
| 10b. Level II Concentrations | ** | ______ | |
| 10c. Potential Contamination | ** | ______ | |
| 10d. Population (Lines 10a + 10b + 10c) | ** | ______ | |
| 11. Resources | 5 | ______ | |

---

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.
*** No specific maximum value applies to the factor. However, the pathway score based solely on sensitive environments is limited to a maximum of 60.
**** Do not round to the nearest integer.

2/15/90

TABLE 4-1 (Concluded)

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORESHEET
DIXIE CHEMICAL (TXD008088247); PASADENA, TEXAS - PRELIMINARY

# NOT EVALUATED

| Factor Categories and Factors | Maximum Value | Value Assigned | |
|---|---|---|---|
| DRINKING WATER THREAT (Concluded) | | | |
| Targets (Concluded) | | | |
| 12. Targets (Lines 9 + 10d + 11) | ** | ______ | |
| Drinking Water Threat Score | | | |
| 13. Drinking Water Threat Score [(Lines 5 x 8 x 12)/82,500, subject to a maximum of 100] | 100 | | ______ |
| HUMAN FOOD CHAIN THREAT | | | |
| Likelihood of Release | | | |
| 14. Likelihood of Release (Same value as Line 5) | 550 | ______ | |
| Waste Characteristics | | | |
| 15. Toxicity/Persistence/Bioaccumulation | * | ______ | |
| 16. Hazardous Waste Quantity | * | ______ | |
| 17. Waste Characteristics | 1,000 | | ______ |
| Targets | | | |
| 18. Food Chain Individual | 50 | ______ | |
| 19. Population | | | |
| 19a. Potential Human Food Chain Contamination | ** | ______ | |
| 19b. Level I Concentrations | ** | ______ | |
| 19c. Level II Concentrations | ** | ______ | |
| 19d. Population (Lines 19a + 19b + 19c) | ** | ______ | |
| 20. Targets (Lines 18 + 19d) | ** | | ______ |
| Human Food Chain Threat Score | | | |
| 21. Human Food Chain Threat Score [(Lines 14 x 17 x 20)/82,500, subject to a maximum of 100] | 100 | | ______ |

---

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.
*** No specific maximum value applies to the factor. However, the pathway score based solely on sensitive environments is limited to a maximum of 60.
**** Do not round to the nearest integer.

2/15/90

TABLE 4-1 (Concluded)

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORESHEET
DIXIE CHEMICAL (TXD008088247); PASADENA, TEXAS - PRELIMINARY

# NOT EVALUATED

| Factor Categories and Factors | Maximum Value | Value Assigned | |
|---|---|---|---|
| ENVIRONMENTAL THREAT | | | |
| Likelihood of Release | | | |
| 22. Likelihood of Release (Same value as Line 5) | 550 | | ____ |
| Waste Characteristics | | | |
| 23. Ecosystem Toxicity/Persistence/ Bioaccumulation | * | ____ | |
| 24. Hazardous Waste Quantity | * | ____ | |
| 25. Waste Characteristics | 1,000 | | ____ |
| Targets | | | |
| 26. Sensitive Environments | | | |
| 26a. Level I Concentrations | ** | ____ | |
| 26b. Level II Concentrations | ** | ____ | |
| 26c. Potential Contamination | ** | ____ | |
| 26d. Sensitive Environments (Lines 26a + 26b + 26c) | ** | ____ | |
| 27. Targets (Value from Line 26d) | ** | | ____ |
| Environmental Threat Score | | | |
| 28. Environmental Threat Score [(Lines 22 x 25 x 27)/82,500, subject to a maximum of 60] | 60 | | ____ |
| SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORE FOR A WATERSHED | | | |
| 29. Watershed Score**** [(Lines 13 + 21 + 28), subject to a maximum of 100] | 100 | | ____ |
| SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORE | | | |
| 30. Component Score ($S_{of}$)**** [Highest score from Line 29 for all watersheds evaluated, subject to a maximum of 100] | 100 | | |

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.
*** No specific maximum value applies to the factor. However, the pathway score based solely on sensitive environments is limited to a maximum of 60.
**** Do not round to the nearest integer.

2/15/90

TABLE 4-25

GROUND WATER TO SURFACE WATER MIGRATION COMPONENT SCORESHEET
DIXIE CHEMICAL (TXD008088247); PASADENA, TEXAS - PRELIMINARY

# NOT EVALUATED

| Factor Categories and Factors | Maximum Value | Value Assigned | |
|---|---|---|---|
| DRINKING WATER THREAT | | | |
| Likelihood of Release to Aquifer | | | |
| 1. Observed Release | 550 | ____ | |
| 2. Potential to Release | | | |
| 2a. Containment | 10 | ____ | |
| 2b. Net Precipitation | 10 | ____ | |
| 2c. Depth to Aquifer | 5 | ____ | |
| 2d. Travel Tim | 35 | ____ | |
| 2e. Potential to Release [Lines 2a x (2b + 2c + 2d)] | 500 | ____ | |
| 3. Likelihood of Release (Higher of Lines 1 or 2e) | 550 | | ____ |
| Waste Characteristics | | | |
| 4. Toxicity/Mobility/Persistence | * | ____ | |
| 5. Hazardous Waste Quantity | * | ____ | |
| 6. Waste Characteristics | 100 | | ____ |
| Targets | | | |
| 7. Nearest Intake | 50 | ____ | |
| 8. Population | | | |
| 8a. Level I Concentrations | ** | ____ | |
| 8b. Level II Concentrations | ** | ____ | |
| 8c. Potential Contamination | ** | ____ | |
| 8d. Population (Lines 8a + 8b + 8c) | | ____ | |
| 9. Resources | 5 | ____ | |
| 10. Targets (Lines 7 + 8d + 9) | ** | | ____ |
| 11. Drinking Water Threat Score [(Lines 3 x 6 x 10)/82,500, subject to a maximum of 100] | 100 | | ____ |

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.
*** No specific maximum value applies to the factor. However, the pathway score based solely on sensitive environments is limited to a maximum of 60.
**** Do not round to the nearest integer.

2/15/90

TABLE 4-25 (Concluded)

GROUND WATER TO SURFACE WATER MIGRATION COMPONENT SCORESHEET
DIXIE CHEMICAL (TXD008088247); PASADENA, TEXAS - PRELIMINARY

# NOT EVALUATED

| Factor Categories and Factors | Maximum Value | Value Assigned | |
|---|---|---|---|
| HUMAN FOOD CHAIN THREAT | | | |
| Likelihood of Release | | | |
| 12. Likelihood of Release (Same value as Line 3) | 550 | ____ | |
| Waste Characteristics | | | |
| 13. Toxicity/Mobility/Persistence Bioaccumulation | * | ____ | |
| 14. Hazardous Waste Quantity | * | ____ | |
| 15. Waste Characteristics | 1,000 | | ____ |
| Targets | | | |
| 16. Food Chain Individual | 50 | ____ | |
| 17. Population | | | |
| 17a. Potential Human Food Chain Contamination | ** | ____ | |
| 17b. Level I Concentrations | ** | ____ | |
| 17c. Level II Concentrations | ** | ____ | |
| 17d. Population (Lines 17a + 17b + 17c) | ** | ____ | |
| 18. Targets (Values from Line 16 + 17d) | ** | | ____ |
| Human Food Chain Threat Score | | | |
| 19. Human Food Chain Threat Score [(Lines 12 x 15 x 18)/82,500, subject to a maximum of 100] | 100 | | ____ |
| ENVIRONMENTAL THREAT | | | |
| Likelihood of Release | | | |
| 20. Likelihood of Release (Same value as Line 3) | 550 | | ____ |

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.
*** No specific maximum value applies to the factor. However, the pathway score based solely on sensitive environments is limited to a maximum of 60.
**** Do not round to the nearest integer.

2/15/90

TABLE 4-25 (Concluded)

GROUND WATER TO SURFACE WATER MIGRATION COMPONENT SCORESHEET
DIXIE CHEMICAL (TXD008088247); PASADENA, TEXAS - PRELIMINARY

# NOT EVALUATED

| Factor Categories and Factors | Maximum Value | Value Assigned | |
|---|---|---|---|
| ENVIRONMENTAL THREAT (Concluded) | | | |
| Waste Characteristics | | | |
| 21. Ecosystem Toxicity/Mobility/ Persistence/Bioaccumulation | * | ___ | |
| 22. Hazardous Waste Quantity | * | | ___ |
| 23. Waste Characteristics | 1,000 | | ___ |
| Targets | | | |
| 24. Sensitive Environments | | | |
| 24a. Level I Concentrations | ** | ___ | |
| 24b. Level II Concentrations | ** | ___ | |
| 24c. Potential Contamination | ** | ___ | |
| 24d. Sensitive Environments (Lines 24a + 24b + 24c) | ** | ___ | |
| 25. Targets (Value from Line 24d) | ** | | ___ |
| Environmental Threat Score | | | |
| 26. Environmental Threat Score [(Lines 20 x 23 x 25)/82,500, subject to a maximum of 60] | 60 | | ___ |
| GROUND WATER TO SURFACE WATER MIGRATION COMPONENT SCORE FOR A WATERSHED | | | |
| 27. Watershed Score**** [(Lines 11 + 19 + 26), subject to a maximum of 100)] | 100 | | |
| GROUND WATER TO SURFACE WATER MIGRATION COMPONENT SCORE | | | |
| 28. Component Score ($S_{gs}$)**** (Highest score from Line 27 for all watersheds evaluated, subject to a maximum of 100) | | | |

---

* Maximum value applies to waste characteristics category.

** Maximum value not applicable.

*** No specific maximum value applies to the factor. However, the pathway score based solely on sensitive environments is limited to a maximum of 60.

**** Do not round to the nearest integer.

2/15/90

TABLE 5-1

SOIL EXPOSURE PATHWAY SCORESHEET
DIXIE CHEMICAL (TXD008088247); PASADENA, TEXAS - PRELIMINARY

| Factor Categories and Factors | Maximum Value | Value Assigned | |
|---|---|---|---|
| RESIDENT POPULATION THREAT | | | |
| Likelihood of Exposure | | | |
| 1. Likelihood of Exposure | 550 | | 550 |
| Waste Characteristics | | | |
| 2. Toxicity | * | 10 | |
| 3. Hazardous Waste Quantity | * | 10,000 | |
| 4. Waste Characteristics | 100 | | 18 |
| Targets | | | |
| 5. Resident Individual | 50 | 0 | |
| 6. Resident Population | | | |
| 6a. Level I Concentrations | ** | 0 | |
| 6b. Level II Concentrations | ** | 0 | |
| 6c. Resident Population (Lines 6a + 6b) | ** | 0 | |
| 7. Workers | 15 | 5 | |
| 8. Resources | 5 | 0 | |
| 9. Terrestrial Sensitive Environments | *** | 0 | |
| 10. Targets (Lines 5 + 6c + 7 + 8 + 9) | ** | | 5 |
| Resident Population Threat Score | | | |
| 11. Resident Population Threat (Lines 1a x 4 x 10) | ** | | 49,500 |
| NEARBY POPULATION THREAT | | | |
| Likelihood of Exposure | | | |
| 12. Attractiveness/Assessibility | 100 | 5 | |
| 13. Area of Contamination | 100 | 0 | |
| 14. Likelihood of Exposure | 500 | | 0 |

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.
*** No specific maximum value applies to the factor. However, the pathway score based solely on sensitive environments is limited to a maximum of 60.
**** Do not round to the nearest integer.

2/15/90

TABLE 5-1 (Concluded)

SOIL EXPOSURE PATHWAY SCORESHEET
DIXIE CHEMICAL (TXD008088247); PASADENA, TEXAS - PRELIMINARY

| Factor Categories and Factors | Maximum Value | Value Assigned | |
|---|---|---|---|
| NEARBY POPULATION THREAT (Concluded) | | | |
| Waste Characteristics | | | |
| 15. Toxicity | * | 10 | |
| 16. Hazardous Waste Quantity | * | 10,000 | |
| 17. Waste Characteristics | 100 | | 18 |
| Targets | | | |
| 18. Nearby Individual | 1 | 0 | |
| 19. Population Within 1-Mile | ** | 0 | |
| 20. Targets (Lines 18 + 19) | ** | | 0 |
| Nearby Population Threat Score | | | |
| 21. Nearby Population Threat (Lines 14 x 17 x 20) | ** | | 0 |
| SOIL EXPOSURE PATHWAY SCORE | | | |
| 22. Soil Exposure Pathway Score**** ($S_s$)[Lines (11 + 21) ÷ 82,500 subject to a maximum of 100] | 100 | | $\boxed{0.6}$ |

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.
*** No specific maximum value applies to the factor. However, the pathway score based solely on sensitive environments is limited to a maximum of 60.
**** Do not round to the nearest integer.

2/15/90

TABLE 6-1

AIR MIGRATION PATHWAY SCORESHEET
DIXIE CHEMICAL (TXD008088247); PASADENA, TEXAS - PRELIMINARY

| Factor Categories and Factors | Maximum Value | Value Assigned | |
|---|---|---|---|
| **Likelihood of Release** | | | |
| 1. Observed Release | 550 | 0 | |
| 2. Potential to Release | | | |
| 2a. Gas Potential to Release | 500 | 330 | |
| 2b. Particulate Potential to Release | 500 | 77 | |
| 2c. Potential to Release (Highest value assigned in Line 2a or 2b) | 500 | 330 | |
| 3. Likelihood of Release (Higher of Lines 1 or 2c) | 550 | | 330 |
| **Waste Characteristics** | | | |
| 4. Toxicity/Mobility | * | 0.08 | |
| 5. Hazardous Waste Quantity | * | 10,000 | |
| 6. Waste Characteristics | 100 | | 3 |
| **Targets** | | | |
| 7. Nearest Individual | 50 | 20 | |
| 8. Population | | | |
| 8a. Level I Concentrations | ** | 0 | |
| 8b. Level II Concentrations | ** | 0 | |
| 8c. Potential Contamination | ** | 2.7 | |
| 8d. Population (Lines 8a + 8b + 8c) | ** | 2.7 | |
| 9. Resources | 5 | 5 | |
| 10. Sensitive Environments | | | |
| 10a. Actual Contamination | *** | 0 | |
| 10b. Potential Contamination | *** | 0.132 | |
| 10c. Sensitive Environments (Lines 10a + 10b) | *** | 0.132 | |
| 11. Targets (Lines 7 + 8d + 9 + 10c) | ** | | 27.83 |
| **Air Migration Pathway Score** | | | |
| 12. Pathway Score ($S_a$) [(Lines 3 x 6 x 11)/82,500]**** | 100 | | 0.334 |

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.
*** No specific maximum value applies to the factor. However, the pathway score based solely on sensitive environments is limited to a maximum of 60.
**** Do not round to the nearest integer.

2/15/90

TABLE 3-1

GROUND WATER MIGRATION PATHWAY SCORESHEET
DIXIE CHEMICAL (TXD008088247); PASADENA, TEXAS - PROJECTED

| Factor Categories and Factors | | Maximum Value | Value Assigned | |
|---|---|---|---|---|
| | **Likelihood of Release to an Aquifer** | | | |
| 1. | Observed Release | 550 | 550 | |
| 2. | Potential to Release | | | |
| | 2a. Containment | 10 | | |
| | 2b. Net Precipitation | 10 | | |
| | 2c. Depth to Aquifer | 5 | | |
| | 2d. Travel Time | 35 | | |
| | 2e. Potential to Release [Lines 2a x (2b + 2c + 2d)] | 500 | | |
| 3. | Likelihood of Release [Higher of Lines 1 or 2e] | 550 | | 550 |
| | **Waste Characteristics** | | | |
| 4. | Toxicity / Mobility | * | 2,000 | |
| 5. | Hazardous Waste Quantity | * | 10,000 | |
| 6. | Waste Characteristics | 100 | | 56 |
| | **Targets** | | | |
| 7. | Nearest Well | 50 | 3 | |
| 8. | Population | | | |
| | 8a. Level I Concentrations | ** | 0 | |
| | 8b. Level II Concentrations | ** | 0 | |
| | 8c. Potential Contamination | ** | 67.8 | |
| | 8d. Population (Lines 8a + 8b + 8c) | ** | 67.8 | |
| 9. | Resources | 5 | 5 | |
| 10. | Wellhead Protection Area | 20 | 20 | |
| 11. | Targets (Lines 7 + 8d + 9 + 10) | ** | | 95.8 |
| | **Ground Water Migration Score for an Aquifer** | | | |
| 12. | Aquifer Score [(Lines 3 x 6 x 11)/82,500]**** | 100 | | 35.77 |
| | **Ground Water Migration Pathway Score** | | | |
| 13. | Pathway Score ($S_{gw}$), (Highest value from Line 12 for all aquifers evaluated)**** | 100 | | 35.77 |

---

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.
*** No specific maximum value applies to the factor. However, the pathway score based solely on sensitive environments is limited to a maximum of 60.
**** Do not round to the nearest integer.

2/15/90

TABLE 4-1

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORESHEET
DIXIE CHEMICAL (TXD008088247); PASADENA, TEXAS - PROJECTED

# NOT EVALUATED

| Factor Categories and Factors | Maximum Value | Value Assigned | |
|---|---|---|---|
| DRINKING WATER THREAT | | | |
| Likelihood of Release | | | |
| 1. Observed Release | 550 | ____ | |
| 2. Potential to Release by Overland Flow | | | |
| 2a. Containment | 10 | ____ | |
| 2b. Runoff | 25 | ____ | |
| 2c. Distance to Surface Water | 25 | ____ | |
| 2d. Potential to Release by Overland Flow [Lines 2a x (2b + 2c)] | 500 | ____ | |
| 3. Potential to Release by Flood | | | |
| 3a. Containment (Flood) | 10 | ____ | |
| 3b. Flood Frequency | 50 | ____ | |
| 3c. Potential to Release by Flood (Lines 3a x 3b) | 500 | ____ | |
| 4. Potential to Release [(Lines 2d + 3c), subject to a maximum of 500] | 500 | ____ | |
| 5. Likelihood to Release (Higher of Lines 1 or 4) | 550 | | ____ |
| Waste Characteristics | | | |
| 6. Toxicity/Persistence | * | ____ | |
| 7. Hazardous Waste Quantity | * | ____ | |
| 8. Waste Characteristics | 100 | | ____ |
| Targets | | | |
| 9. Nearest Intake | 50 | ____ | |
| 10. Population | | | |
| 10a. Level I Concentrations | ** | ____ | |
| 10b. Level II Concentrations | ** | ____ | |
| 10c. Potential Contamination | ** | ____ | |
| 10d. Population (Lines 10a + 10b + 10c) | ** | ____ | |
| 11. Resources | 5 | ____ | |

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.
*** No specific maximum value applies to the factor. However, the pathway score based solely on sensitive environments is limited to a maximum of 60.
**** Do not round to the nearest integer.

2/15/90

TABLE 4-1 (Concluded)

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORESHEET
DIXIE CHEMICAL (TXD008088247); PASADENA, TEXAS - PROJECTED

# NOT EVALUATED

| Factor Categories and Factors | Maximum Value | Value Assigned | |
|---|---|---|---|
| DRINKING WATER THREAT (Concluded) | | | |
| Targets (Concluded) | | | |
| 12. Targets (Lines 9 + 10d + 11) | ** | ______ | |
| Drinking Water Threat Score | | | |
| 13. Drinking Water Threat Score [(Lines 5 x 8 x 12)/82,500, subject to a maximum of 100] | 100 | | ______ |
| HUMAN FOOD CHAIN THREAT | | | |
| Likelihood of Release | | | |
| 14. Likelihood of Release (Same value as Line 5) | 550 | ______ | |
| Waste Characteristics | | | |
| 15. Toxicity/Persistence/Bioaccumulation | * | ______ | |
| 16. Hazardous Waste Quantity | * | ______ | |
| 17. Waste Characteristics | 1,000 | | ______ |
| Targets | | | |
| 18. Food Chain Individual | 50 | ______ | |
| 19. Population | | | |
| 19a. Potential Human Food Chain Contamination | ** | ______ | |
| 19b. Level I Concentrations | ** | ______ | |
| 19c. Level II Concentrations | ** | ______ | |
| 19d. Population (Lines 19a + 19b + 19c) | ** | ______ | |
| 20. Targets (Lines 18 + 19d) | ** | | ______ |
| Human Food Chain Threat Score | | | |
| 21. Human Food Chain Threat Score [(Lines 14 x 17 x 20)/82,500, subject to a maximum of 100] | 100 | | ______ |

---

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.
*** No specific maximum value applies to the factor. However, the pathway score based solely on sensitive environments is limited to a maximum of 60.
**** Do not round to the nearest integer.

2/15/90

TABLE 4-1 (Concluded)

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORESHEET
DIXIE CHEMICAL (TXD008088247); PASADENA, TEXAS - PROJECTED

# NOT EVALUATED

| Factor Categories and Factors | Maximum Value | Value Assigned | |
|---|---|---|---|
| ENVIRONMENTAL THREAT | | | |
| Likelihood of Release | | | |
| 22. Likelihood of Release (Same value as Line 5) | 550 | | ____ |
| Waste Characteristics | | | |
| 23. Ecosystem Toxicity/Persistence/ Bioaccumulation | * | ____ | |
| 24. Hazardous Waste Quantity | * | ____ | |
| 25. Waste Characteristics | 1,000 | | ____ |
| Targets | | | |
| 26. Sensitive Environments | | | |
| 26a. Level I Concentrations | ** | ____ | |
| 26b. Level II Concentrations | ** | ____ | |
| 26c. Potential Contamination | ** | ____ | |
| 26d. Sensitive Environments (Lines 26a + 26b + 26c) | ** | ____ | |
| 27. Targets (Value from Line 26d) | ** | | ____ |
| Environmental Threat Score | | | |
| 28. Environmental Threat Score [(Lines 22 x 25 x 27)/82,500, subject to a maximum of 60] | 60 | | ____ |
| SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORE FOR A WATERSHED | | | |
| 29. Watershed Score**** [(Lines 13 + 21 + 28), subject to a maximum of 100] | 100 | | ____ |
| SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORE | | | |
| 30. Component Score ($S_{of}$)**** [Highest score from Line 29 for all watersheds evaluated, subject to a maximum of 100] | 100 | | $\boxed{\quad}$ |

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.
*** No specific maximum value applies to the factor. However, the pathway score based solely on sensitive environments is limited to a maximum of 60.
**** Do not round to the nearest integer.

2/15/90

TABLE 4-25

GROUND WATER TO SURFACE WATER MIGRATION COMPONENT SCORESHEET
DIXIE CHEMICAL (TXD008088247); PASADENA, TEXAS - PROJECTED

# NOT EVALUATED

| Factor Categories and Factors | Maximum Value | Value Assigned | |
|---|---|---|---|
| DRINKING WATER THREAT | | | |
| Likelihood of Release to Aquifer | | | |
| 1. Observed Release | 550 | ______ | |
| 2. Potential to Release | | | |
| 2a. Containment | 10 | ______ | |
| 2b. Net Precipitation | 10 | ______ | |
| 2c. Depth to Aquifer | 5 | ______ | |
| 2d. Travel Tim | 35 | ______ | |
| 2e. Potential to Release [Lines 2a x (2b + 2c + 2d)] | 500 | ______ | |
| 3. Likelihood of Release (Higher of Lines 1 or 2e) | 550 | | ______ |
| Waste Characteristics | | | |
| 4. Toxicity/Mobility/Persistence | * | ______ | |
| 5. Hazardous Waste Quantity | * | ______ | |
| 6. Waste Characteristics | 100 | | ______ |
| Targets | | | |
| 7. Nearest Intake | 50 | ______ | |
| 8. Population | | | |
| 8a. Level I Concentrations | ** | ______ | |
| 8b. Level II Concentrations | ** | ______ | |
| 8c. Potential Contamination | ** | ______ | |
| 8d. Population (Lines 8a + 8b + 8c) | | ______ | |
| 9. Resources | 5 | ______ | |
| 10. Targets (Lines 7 + 8d + 9) | ** | | ______ |
| 11. Drinking Water Threat Score [(Lines 3 x 6 x 10)/82,500, subject to a maximum of 100] | 100 | | ______ |

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.
*** No specific maximum value applies to the factor. However, the pathway score based solely on sensitive environments is limited to a maximum of 60.
**** Do not round to the nearest integer.

2/15/90

TABLE 4-25 (Concluded)

GROUND WATER TO SURFACE WATER MIGRATION COMPONENT SCORESHEET
DIXIE CHEMICAL (TXD008088247); PASADENA, TEXAS - PROJECTED

# NOT EVALUATED

| Factor Categories and Factors | Maximum Value | Value Assigned | |
|---|---|---|---|
| HUMAN FOOD CHAIN THREAT | | | |
| Likelihood of Release | | | |
| 12. Likelihood of Release (Same value as Line 3) | 550 | ____ | |
| Waste Characteristics | | | |
| 13. Toxicity/Mobility/Persistence Bioaccumulation | * | ____ | |
| 14. Hazardous Waste Quantity | * | ____ | |
| 15. Waste Characteristics | 1,000 | | ____ |
| Targets | | | |
| 16. Food Chain Individual | 50 | ____ | |
| 17. Population | | | |
| 17a. Potential Human Food Chain Contamination | ** | ____ | |
| 17b. Level I Concentrations | ** | ____ | |
| 17c. Level II Concentrations | ** | ____ | |
| 17d. Population (Lines 17a + 17b + 17c) | ** | ____ | |
| 18. Targets (Values from Line 16 + 17d) | ** | | ____ |
| Human Food Chain Threat Score | | | |
| 19. Human Food Chain Threat Score [(Lines 12 x 15 x 18)/82,500, subject to a maximum of 100] | 100 | | ____ |
| ENVIRONMENTAL THREAT | | | |
| Likelihood of Release | | | |
| 20. Likelihood of Release (Same value as Line 3) | 550 | | ____ |

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.
*** No specific maximum value applies to the factor. However, the pathway score based solely on sensitive environments is limited to a maximum of 60.
**** Do not round to the nearest integer.

2/15/90

TABLE 4-25 (Concluded)

GROUND WATER TO SURFACE WATER MIGRATION COMPONENT SCORESHEET
DIXIE CHEMICAL (TXD008088247); PASADENA, TEXAS - PROJECTED

# NOT EVALUATED

| Factor Categories and Factors | Maximum Value | Value Assigned | |
|---|---|---|---|
| ENVIRONMENTAL THREAT (Concluded) | | | |
| Waste Characteristics | | | |
| 21. Ecosystem Toxicity/Mobility/ Persistence/Bioaccumulation | * | ____ | |
| 22. Hazardous Waste Quantity | * | | ____ |
| 23. Waste Characteristics | 1,000 | | ____ |
| Targets | | | |
| 24. Sensitive Environments | | | |
| 24a. Level I Concentrations | ** | ____ | |
| 24b. Level II Concentrations | ** | ____ | |
| 24c. Potential Contamination | ** | ____ | |
| 24d. Sensitive Environments (Lines 24a + 24b + 24c) | ** | ____ | |
| 25. Targets (Value from Line 24d) | ** | | ____ |
| Environmental Threat Score | | | |
| 26. Environmental Threat Score [(Lines 20 x 23 x 25)/82,500, subject to a maximum of 60] | 60 | | ____ |
| GROUND WATER TO SURFACE WATER MIGRATION COMPONENT SCORE FOR A WATERSHED | | | |
| 27. Watershed Score**** [(Lines 11 + 19 + 26), subject to a maximum of 100)] | 100 | | |
| GROUND WATER TO SURFACE WATER MIGRATION COMPONENT SCORE | | | |
| 28. Component Score ($S_{gs}$)**** (Highest score from Line 27 for all watersheds evaluated, subject to a maximum of 100) | | | |

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.
*** No specific maximum value applies to the factor. However, the pathway score based solely on sensitive environments is limited to a maximum of 60.
**** Do not round to the nearest integer.

2/15/90

TABLE 5-1

SOIL EXPOSURE PATHWAY SCORESHEET
DIXIE CHEMICAL (TXD008088247); PASADENA, TEXAS - PROJECTED

| Factor Categories and Factors | Maximum Value | Value Assigned | |
|---|---|---|---|
| RESIDENT POPULATION THREAT | | | |
| Likelihood of Exposure | | | |
| 1. Likelihood of Exposure | 550 | | 550 |
| Waste Characteristics | | | |
| 2. Toxicity | * | 10 | |
| 3. Hazardous Waste Quantity | * | 10,000 | |
| 4. Waste Characteristics | 100 | | 18 |
| Targets | | | |
| 5. Resident Individual | 50 | 0 | |
| 6. Resident Population | | | |
| 6a. Level I Concentrations | ** | 0 | |
| 6b. Level II Concentrations | ** | 0 | |
| 6c. Resident Population (Lines 6a + 6b) | ** | 0 | |
| 7. Workers | 15 | 5 | |
| 8. Resources | 5 | 0 | |
| 9. Terrestrial Sensitive Environments | *** | 40 | |
| 10. Targets (Lines 5 + 6c + 7 + 8 + 9) | ** | | 45 |
| Resident Population Threat Score | | | |
| 11. Resident Population Threat (Lines 1a x 4 x 10) | ** | | 445,500 |
| NEARBY POPULATION THREAT | | | |
| Likelihood of Exposure | | | |
| 12. Attractiveness/Assessibility | 100 | 5 | |
| 13. Area of Contamination | 100 | 0 | |
| 14. Likelihood of Exposure | 500 | | 0 |

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.
*** No specific maximum value applies to the factor. However, the pathway score based solely on sensitive environments is limited to a maximum of 60.
**** Do not round to the nearest integer.

2/15/90

TABLE 5-1 (Concluded)

SOIL EXPOSURE PATHWAY SCORESHEET
DIXIE CHEMICAL (TXD008088247); PASADENA, TEXAS - PROJECTED

| Factor Categories and Factors | Maximum Value | Value Assigned | |
|---|---|---|---|
| NEARBY POPULATION THREAT (Concluded) | | | |
| Waste Characteristics | | | |
| 15. Toxicity | * | 10 | |
| 16. Hazardous Waste Quantity | * | 10,000 | |
| 17. Waste Characteristics | 100 | | 18 |
| Targets | | | |
| 18. Nearby Individual | 1 | 0 | |
| 19. Population Within 1-Mile | ** | 0 | |
| 20. Targets (Lines 18 + 19) | ** | | 0 |
| Nearby Population Threat Score | | | |
| 21. Nearby Population Threat (Lines 14 x 17 x 20) | ** | | 0 |
| SOIL EXPOSURE PATHWAY SCORE | | | |
| 22. Soil Exposure Pathway Score**** ($S_s$)[Lines (11 + 21) ÷ 82,500 subject to a maximum of 100] | 100 | | 5.4 |

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.
*** No specific maximum value applies to the factor. However, the pathway score based solely on sensitive environments is limited to a maximum of 60.
**** Do not round to the nearest integer.

2/15/90

TABLE 6-1

AIR MIGRATION PATHWAY SCORESHEET
DIXIE CHEMICAL (TXD008088247); PASADENA, TEXAS - PROJECTED

| Factor Categories and Factors | Maximum Value | Value Assigned | |
|---|---|---|---|
| **Likelihood of Release** | | | |
| 1. Observed Release | 550 | 0 | |
| 2. Potential to Release | | | |
| 2a. Gas Potential to Release | 500 | 330 | |
| 2b. Particulate Potential to Release | 500 | 77 | |
| 2c. Potential to Release (Highest value assigned in Line 2a or 2b) | 500 | 330 | |
| 3. Likelihood of Release (Higher of Lines 1 or 2c) | 550 | | 330 |
| **Waste Characteristics** | | | |
| 4. Toxicity/Mobility | * | 0.08 | |
| 5. Hazardous Waste Quantity | * | 10,000 | |
| 6. Waste Characteristics | 100 | | 3 |
| **Targets** | | | |
| 7. Nearest Individual | 50 | 20 | |
| 8. Population | | | |
| 8a. Level I Concentrations | ** | 0 | |
| 8b. Level II Concentrations | ** | 0 | |
| 8c. Potential Contamination | ** | 2.7 | |
| 8d. Population (Lines 8a + 8b + 8c) | ** | 2.7 | |
| 9. Resources | 5 | 5 | |
| 10. Sensitive Environments | | | |
| 10a. Actual Contamination | *** | 0 | |
| 10b. Potential Contamination | *** | 40.132 | |
| 10c. Sensitive Environments (Lines 10a + 10b) | *** | 40.132 | |
| 11. Targets (Lines 7 + 8d + 9 + 10c) | ** | | 67.8 |
| **Air Migration Pathway Score** | | | |
| 12. Pathway Score ($S_a$) [(Lines 3 x 6 x 11)/82,500]**** | 100 | | 0.814 |

---

* Maximum value applies to waste characteristics category.

** Maximum value not applicable.

*** No specific maximum value applies to the factor. However, the pathway score based solely on sensitive environments is limited to a maximum of 60.

**** Do not round to the nearest integer. 2/15/90

# ATTACHMENT A

# SOLID WASTE MANAGEMENT UNITS (SWMUs)

II-B-1

# RCRA FACILITY ASSESSMENT
# PR/VSI REPORT

[redacted]
PASADENA, TEXAS
EPA [redacted]

Prepared for:

U.S. Environmental Protection Agency
Region VI
1445 Ross Avenue
Dallas, Texas 75202

Prepared by:

A.T. Kearney, Inc.
3 Lagoon Drive, Suite 170
Redwood City, California 94065

and

Science Applications International Corporation
13400-B Northup Way, Suite 38
Bellevue, Washington 98005

EPA Contract No. 68-01-7374
Work Assignment No. R26-01-36
SAIC Project No. 2-817-08-042-00



August 1987

TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

TABLE OF CONTENTS (continued)

TABLE OF CONTENTS (continued)

## 5.0 DESCRIPTIONS OF INDIVIDUAL UNITS

### 5.1 SWMU # 1 - TWELVE PLANT A PROCESS AREA SUMPS

#### 5.1.1 Information Summary

Unit Description: In each of the seven process areas within Plant A are sumps which serve to carry storm runoff and process wastewater to the treatment system. The sumps are below grade, constructed of concrete, and are approximately three feet in diameter.(17) The depth of the sumps are unknown. Two of the twelve sumps were observed during the VSI.

Dates of Operation: The date of startup of these units is presumed to be the dates when each of the process areas came on-line. They are all active units.(17)

Wastes Managed: The sumps contain a mixture of storm runoff and process wastewater including boiler blowdown containing various metals, dilute dibasic acids, and other unspecified wastewaters.(17)

Release Controls: The sumps are located within curbed, concrete-lined process areas. They each contain level activated pumps for overflow control. Water is pumped to the wastewater treatment system.(17)

History of Releases: There is no documented release history for these units. No evidence of release was observed during the VSI.(17)

#### 5.1.2 Release Potential

- Soil/Groundwater: The potential for release of hazardous constituents to soil from these sumps is dependent on the integrity of the sump. Based on the condition of the sumps observed during the VSI, the potential for release from these units is low.

- Surface Water: There is no potential for the release of hazardous constituents from the sumps to surface water as they are fully contained within concrete curbed areas and are equipped with level activated pumps.

- Air: Based on the non-volatile nature of the wastes placed in these units, there is no known potential for the release of hazardous constituents to air.

- Subsurface Gas: Based on the waste types entering the sumps, there is no potential for the generation of subsurface gas.

## 5.2 SWMU #2 - SIX PLANT B PROCESS AREA SUMPS

### 5.2.1 Information Summary

Unit Description: In each of the process areas within Plant B are sumps which serve to carry storm runoff and process wastewater to the treatment system. The sumps are below grade, constructed of concrete, and are approximately three feet in diameter.(17) The depth of the sumps are unknown. One of the six sumps was observed during the VSI.

Dates of Operation: The date of startup of these units is presumed to be the dates when Plant B came on-line. They are all active units.(17)

Wastes Managed: The sumps contain a mixture of storm runoff and process wastewater including boiler blowdown containing various metals, dilute dibasic acids, and other unspecified wastewaters.(17)

Release Controls: The sumps are located within curbed, concrete-lined process areas. They each contain level activated pumps for overflow control. Water is pumped to the wastewater treatment system.(17)

History of Releases: There is no documented release history for these units. No evidence of release was observed during the VSI.(17)

### 5.2.2 Release Potential

- Soil/Groundwater: The potential for release of hazardous constituents to soil from these sumps is dependent on the integrity of the sump. Based on the condition of the sumps observed during the VSI, the potential for release from these units is low.

- Surface Water: There is no potential for the release of hazardous constituents from the sumps to surface water as they are fully contained within concrete curbed areas and are equipped with level activated pumps.

- Air: Based on the non-volatile nature of the wastes placed in these units, there is no known potential for the release of hazardous constituents to air.

- Subsurface Gas: Based on the waste types entering the sumps, there is no potential for the generation of subsurface gas.

## 5.3 SWMU #3 - WEST SUMP AND DITCH

### 5.3.1 Information Summary

Unit Description: The West Sump and Ditch receives stormwater and process wastewater from Plant B. The ditch is an unlined below grade ditch approximately three feet wide and at least two feet deep. It extends along the western side of the Plant B area, and is terminated at the south end by the West Sump. The sump is approximately three feet in diameter and of unspecified depth. Water entering the sump is pumped directly to the Equalization Basin (SWMU #8). At the time of the VSI, standing water was present in the sump and ditch.(17) The unit is directly next to the discharge canal which carries other plant wastewaters to the Industrial Wastewater Treatment Plant.

Dates of Operation: This sump and ditch have been active since the startup of Plant B in late 1974. This is an active unit.(17)

Wastes Managed: The sump and ditch receive wastewaters from the production of dibasic acids. These wastewaters are acidic, but are not expected to contain other hazardous constituents.(17) The sump also receives storm runoff from the Plant B portion of the property, containing unspecified constituents.

Release Controls: The ditch is unlined. The sump is constructed of concrete. (17) The sump is equipped with a level-activated pump.

History of Releases: There is no documented history of releases from this unit. The lack of an impermeable lining of the ditch infers that wastewater has percolated as well as being conveyed along the ditch.

### 5.3.2 Release Potential

- Soil/Groundwater: There is a high potential for past and ongoing release to soil and groundwater from this unit, based on the presence of the unlined ditch. There is only a very low potential for release from the sump itself.

- Surface Water: This unit is directly next to the discharge canal which carries other plant wastewaters to the industrial waste treatment plant.

Overflows of the ditch during heavy rains could reach this discharge canal via overflow to an off-site storm ditch. There is no other apparent potential for surface water releases.

- Air: The wastes carried in this unit are not volatile. Therefore, there is a no potential for the release of hazardous constituents to air.

- Subsurface Gas: Based on the inorganic nature of the wastes, there is no potential for the generation of subsurface gas.

### 5.4 SWMU #4 - AREA 100 SOUTH DITCH

#### 5.4.1 Information Summary

Unit Description: On the south side of Area 100 is an unlined ditch which carries some process wastes as well as storm runoff from the 100 Area and from the adjacent tank farm in Plant A. The ditch is approximately three feet wide and several hundred feet long. It is about one foot deep.(17) The process area in which the ditch is located is surrounded by 3 foot high earthen and concrete berms. Wastewaters in this ditch flow to a sump which discharges to the wastewater treatment system.

Dates of Operation: The ditch has been present since the late 1960's. It is an active unit.(17)

Wastes Managed: The ditch carries process wastewater from the 100 Area in addition to stormwater. Wastewaters may contain glycidol, anhydrides, various surfactants, as well as other complex hydrocarbons.(17)

Release Controls: There are no release controls for this unit other than that it is contained within the facility's stormwater control area. Overflows would thus be directed to a sump and pumped to the plant's wastewater treatment system.

History of Releases: There is no documented history of release for this unit. Although there was no standing liquid observed in the ditch during the VSI, sludges and mud were present, indicating a recent release to soil.(17)

#### 5.4.2 Release Potential

- Soil/Groundwater: Releases to soil occur from this unit on an ongoing basis. There is a high potential for release to groundwater due to the constant hydraulic gradient serving to drive hazardous constituents downward.

- Surface Water: There is no known potential for release of hazardous constituents to surface water from this unit, as it is located within Plant A's stormwater control area.

- Air: Wastes carried in this ditch have very low vapor pressures; thus the potential for release of hazardous wastes or constituents to air is low.

- Subsurface Gas: The presence of organic waste constituents in wastewater continually seeping into the soil could lead to anaerobic conditions, thus posing a low to moderate potential for the generation of subsurface gas.

## 5.5 SWMU #5 - AREA 300/400 NORTH DITCH

### 5.5.1 Information Summary

Unit Description: On the north side of Area 300/400 is an unlined ditch which carries storm runoff from the 300/400 Area in Plant A. The ditch is approximately three feet wide and several hundred feet long. It is about one foot deep.(17) The process area in which the ditch is located is surrounded by 3 foot high earthen and concrete berms. Wastewaters in this ditch flow to a sump which discharges to the wastewater treatment system.(17)

Dates of Operation: The ditch has been present since the late 1960's. It is an active unit.(17)

Wastes Managed: The ditch carries stormwater from the 300/400 Area. Hazardous wastes or constituents may include butanediol and acetonitrile, as well as other complex hydrocarbons.(17)

Release Controls: There are no release controls for this unit.

History of Releases: There is no documented history of release for this unit. Standing liquid was observed in the ditch during the VSI, indicating an ongoing release to soil.(17)

### 5.5.2 Release Potential

- Soil/Groundwater: Releases to soil of constituents in low concentrations occur from this unit on an ongoing basis. There is a high potential for release to groundwater due to the constant hydraulic gradient serving to drive hazardous constituents downward.

- Surface Water: There is no known potential for release of hazardous constituents to surface water from this unit, as it is located within a diked process area of Plant A.

- Air: This unit carries only stormwater; therefore, constituents present are thought to be in low concentration and thus would present only a low potential for release of hazardous constituents to air.

- Subsurface Gas: The presence of low concentrations of organic waste constituents in stormwater continually seeping into the soil could lead to anaerobic conditions, thus posing a low potential for the generation of subsurface gas.

## 5.6 SWMU #6 - ELEMENTARY NEUTRALIZATION FACILITY (a.k.a., Biotatron)

### 5.6.1 Information Summary

Unit Description: The Elementary Neutralization Facility (ENF) consists of two 50,000 gallon tanks located at the northern edge of the property west of former Ponds A and B (SWMU #7). The tanks are constructed of carbon steel and are open-topped.(5) The platform beneath each of the tanks is concrete, but the tanks are not located within a bermed area of the facility.(17) The tanks currently receive wastewater from the Plant A process units. The current system was designed to prevent highly acidic or caustic wastewater from reaching any of the impoundments, thus rendering wastes in the impoundments RCRA exempt. Wastewater is neutralized in the tanks by mixing acid and caustic wastestreams or by addition of lime, and it is then pumped to the Aeration Basins (SWMU #10).(19) The units each have level-controlled pumps to control overtopping.

The west tank was at one time used as a package biological treatment unit known as the Biotatron; the facility was unable to supply information concerning flow rates or retention times for this unit when it was used for biological treatment.(17)

Dates of Operation: The west tank of this unit was constructed sometime in the early 1970s; the east tank was constructed after 1984.(5,17) These are both active units.(17) The west tank underwent closure as a hazardous waste tank in 1987, under TWC regulation.(14) Wastes were removed and pumped to the wastewater treatment system. Remaining sludge was transferred from the tank to Ponds A and B.(14)

Wastes Managed: Currently the ENF functions as an elementary neutralization facility for acidic and caustic wastes. These neutralized wastewaters subsequently flow to the Aeration Basins (SWMU #10). Prior to 1984, the unit received process wastewater from Plant A and discharged it to Ponds A and B, and was used as a holding tank for Plant A liquids. Sample analyses of sludges in the west tank in 1984 prior to closure indicated chromium at 0.47 mg/kg, pH of 10 S.U., and specific conductivity of 18,500 umhos/cm.(12) Other hazardous constituents present in this tank have not been identified by the facility.

Release Controls: The tanks are located on concrete platforms at the north edge of the property. They are both equipped with level activated pumps which cause wastewater to enter the aeration basins.(17) The unit is located with the facility's stormwater control area; overflows would eventually reach sumps which would convey the liquid back to the wastewater treatment system.

History of Releases: There is no documented history of releases from this unit; no evidence of release was observed during the VSI.

5.6.2 Release Potential

- Soil/Groundwater: Because the tanks are not located within a bermed or curbed area, there is a moderate potential for soil and groundwater release if the units overflow or leak. However, this potential is minimized by the presence of level operated pumps.

- Surface Water: Based on the location of the tanks within the stormwater control area, there is no potential for release of hazardous constituents to surface water.

- Air: Although the units are open-topped, the acid and caustic wastes managed have very low vapor pressures; thus, there is only a low potential for release of hazardous constituents to air during the neutralization process.

- Subsurface Gas: Based on the aboveground construction of the unit, there is no potential for the generation of subsurface gas.

## 5.7 SWMU #7 - PONDS A AND B

### 5.7.1 Information Summary

Unit Description: Ponds A and B were constructed in 1968 as part of the facility's original wastewater treatment system. These ponds were 90 ft x 30 ft x 2-3 ft deep.(5) The ponds were excavated earthen impoundments with "small dikes".(5) The height and construction materials of the dikes are unknown. The ponds were unlined. These ponds received both process water and stormwater, which was held and them pumped to the Biotatron for biological treatment.(8) The area has now been filled in and is graded level.(17) The ponds were closed by solidifying the sludges in the pond bottoms, removing them, and shipping to an off-site disposal facility. Verification sampling was conducted for several organic constituents and heavy metals to determine whether any sludge remained in the bottoms of the ponds.(14) Sample results appear to indicate that no sludges remained.

Dates of Operation: These ponds were constructed in 1968 and used until the early 1980s. An independent engineering firm certified the ponds as closed in February, 1987.(14)

Wastes Managed: The ponds received stormwater, cooling tower blowdown, boiler mud drum wastes, and domestic wastewater. These wastes may have contained various complex hydrocarbons and heavy metals.(13) All liquids had been removed from the ponds as of 1984; rainwater was pumped from the ponds to prevent liquids from accumulating.(8)

Release Controls: These ponds were not lined; they were surrounded by small dikes.(5) They are now closed and covered; the area was graded and level at the time of the VSI.(17)

History of Releases: Groundwater monitoring wells installed as part of closure indicated the presence of acetonitrile and epichlorohydrin, as well as low levels of chromium, cadmium, and lead.(16) It is not clear whether these ponds are the source of the contamination.

### 5.7.2 Release Potential

- Soil/Groundwater: Groundwater releases from these units are RCRA regulated. There was a high potential for soil releases from these ponds while they were active. There is no remaining potential for soil release as wastes have been removed from these units, and the ponds closed and covered.

- Surface Water: There may have been a low potential for release of hazardous constituents to surface water when the ponds were active. Because the units are now closed and covered, there is no remaining potential for the release of hazardous constituents to surface water.

- Air: There may have been a low potential for release of hazardous constituents to air when the ponds were active. Because the units are now closed and covered, there is no remaining potential for the release of hazardous constituents to air.

- Subsurface Gas: There may have been a low potential for generation of subsurface gas when the ponds were active. Although the units are now closed and covered, there are organic compounds present in nearby groundwater monitoring wells. Thus, there is a low ongoing potential for subsurface gas generation.

### 5.8 SWMU #8 - EQUALIZATION BASIN

#### 5.8.1 Information Summary

Unit Description: This RCRA regulated unit is trapezoidal in shape, with sides being approximately 115 ft x 65 ft. Its operating depth is approximately 8 ft with a capacity of 200,000 gallons.(5) The unit receives wastewater from Plant B Process Area Sumps (SWMU #2), and is designed to equalize flow to the Impoundment Basin (SWMU #9).(17) The unit is designed to overflow to the Impoundment Basin.(17)

Dates of Operation: This is an active unit; its date of startup is not known.

Wastes Managed: The wastes entering this unit include vessel residues from dibasic acid production and boiler blowdown, as well as runoff from the tank farm and process areas.(5,17) These wastes are inorganic and are RCRA hazardous due to reactivity and corrosivity.

Release Controls: The unit is lined with native clay. The condition of the clay liners could not be evaluated during the VSI. Wastewaters are allowed to overflow to the Impoundment basin.(17)

History of Releases: There is no documented release history from this unit; no evidence of release was observed during the VSI.

#### 5.8.2 Release Potential

- Soil/Groundwater: There is a low to moderate potential for the release of hazardous constituents to the soils and groundwater beneath this unit, depending on the condition of the native clay liners.

- Surface Water: There is no known potential for the release of hazardous constituents to surface water since the unit is designed to overflow to the Equalization Basin.

- Air: Wastes managed in this unit are inorganic and no aeration occurs during wastewater retention. Therefore, there is no potential for the release of hazardous wastes or constituents to air.

- Subsurface Gas: There is no known potential for the generation of subsurface gas due to the inorganic nature of the waste materials.

## 5.9 SWMU #9 - IMPOUNDMENT BASIN

### 5.9.1 Information Summary

Unit Description: This triangular shaped impoundment has dimensions of 115 ft x 115 ft x 150 ft, with an operating depth of approximately 8 ft.(5) The impoundment is lined on the bottom and sides with native clay. It can hold approximately 220,000 gallons of wastewater. The impoundment is entirely below grade; the portion of the unit above water line is vegetated. The impoundment receives wastes from the tank farm in the Plant B area and from the Equalization Basin (SWMU # 8).(5,17) From here it is pumped to the Aeration Basins (SWMU #10).(17)

Dates of Operation: This is an active unit; its date of startup is not known.

Wastes Managed: The wastes entering this unit include vessel residues from dibasic acid production and boiler blowdown, as well as runoff from the tank farm and process areas.(5,17) The wastes are inorganic and are RCRA hazardous due to reactivity and corrosivity.

Release Controls: The impoundment is lined with native clay. The condition of the liner could not be evaluated during the VSI. The pond is equipped with manually operated pumps to pump wastewater to the Aeration Basins. The unit is contained within the facility's stormwater control area. Overflows from the unit would eventually reach sumps which would pump the water back to the wastewater treatment system.

History of Releases: There is no documented history of releases from this impoundment. No evidence of release was observed during the VSI.

### 5.9.2 Release Potential

- Soil/Groundwater: There is a low to moderate potential for the release of hazardous constituents to the soils and groundwater beneath this unit, depending on the condition of the native clay liners.

- Surface Water: There is no known potential for the release of hazardous constituents to surface water, because any overflow will enter the stormwater control area and re-enter the wastewater treatment system.

- Air: Wastes managed in this unit are inorganic and no aeration occurs during wastewater retention. Therefore, there is no potential for the release of hazardous wastes or constituents to air.

- Subsurface Gas: There is no known potential for the generation of subsurface gas due to the inorganic nature of the wastewater.

## 5.10 SWMU #10 - NORTH AND SOUTH AERATION BASINS

### 5.10.1 Information Summary

Unit Description: The North and South Aeration Basins are triangular shaped basins located in the eastern portion of the Plant B. They are each 125 ft x 225 ft x 250 ft, with an operating depth of approximately 12 ft.(5) They each have an operating capacity of approximately 1.3 million gallons.(5) The ponds have berms approximately 3 ft above grade. The impoundments are lined, have a 2 foot thick clay liner, leachate collection system, a 1.5 ft clay liner, and crushed limestone.(5) It is unknown whether they were first constructed with the liners in place. The ponds contain floating aeration units.(4) Wastewater flows from the ENF (SWMU #6) to the North Aeration Basin, then overflows to the South Aeration Basin, and is subsequently discharged to the Gulf Coast Waste Disposal Authority Industrial Wastewater Treatment Plant via the discharge canal.(17)

Dates of Operation: The age of these units is not known. They are currently active.(17)

Wastes Managed: These units receive neutralized wastewater from the ENF. As such, these wastes would include neutralized dibasic acids, diethylene and triethylene glycols, dibasic esters, butanediol, acetonitrile, and methanol.(4) In 1984, sludges from this unit were analyzed and characterized as Class II wastes under the Texas regulations.(8) Sludges from one of the basins (unknown which one) contained 2500 mg/kg ethylene glycol.(4)

Release Controls: The ponds are double-lined with clay, and have an intermediate leachate collection system.(5) The facility repaired the liner in the South Aeration Basin in 1984 for unspecified reasons.(8)

History of Releases: In a 1984 inspection, the North Aeration Basin was reported to show evidence of overtopping. Organic stains and odors were present along the north side of the basin.(8) Facility representatives indicated that this overtopping was only foam from the impoundment.(8) No evidence of release was observed during the VSI.

5.10.2 Release Potential

- Soil/Groundwater: Groundwater releases from these units are RCRA regulated. Based on the presence of liners and leachate collection system, there is a low potential for the release of hazardous constituents to soil.

- Surface Water: If the impoundments overflowed, there is a low potential that wastewater may enter the discharge canal to the Industrial Wastewater Treatment Plant. No other releases to surface water are expected.

- Air: Because the units are aerated and handle organic constituents, there is a high potential for the release of hazardous constituents to air.

- Subsurface Gas: There is a low potential for the generation of subsurface gas depending on the condition of liners and leachate collection systems for these units.

## 5.11 SWMU #11 - TANK T-1218

### 5.11.1 Information Summary

Unit Description: This RCRA regulated unit is a 2,000 gallon carbon steel holding tank which has been used for the storage of wastes from the 1100/1200 area of Plant A.(5) The tank is 6.5 ft in diameter and 8 ft high.(18) It is currently being used for the storage of products.(17) The tank is in a paved curbed area, with sumps which drain to the wastewater treatment system.(17)

Dates of Operation: The date of startup of this tank is unknown. It was removed from service as a waste tank in 1981.(18)

Wastes Managed: This unit is used for the storage of wet waste epoxy, industrial process wastewater containing unspecified hydrocarbons, and tolyltrazole reactor residues.(2) Wastes in this unit are ignitable.(18)

Release Controls: The tank is in a paved curbed area, with sumps which drain to the wastewater treatment system.(17) It is of closed, fixed roof design, and is equipped with manual waste feed cutoff valves.(18)

History of Releases: There is no documented history of release from this unit. No evidence of release was observed during the VSI.

### 5.11.2 Release Potential

- Soil/Groundwater: Based on the construction and location of the tank, there is no potential for the release of hazardous constituents.

- Surface Water: Based on the construction and location of the tank, there is no potential for the release of hazardous constituents.

- Air: Based on the organic, ignitable wastes managed, there is a low potential for the release of hazardous constituents during maintenance and cleaning.

- Subsurface Gas: Based on the aboveground construction and location of the tank, there is no potential for the release of hazardous constituents.

## 5.12 SWMU #12 - TANK T-1117

### 5.12.1 Information Summary

Unit Description: This RCRA regulated unit is a 2,000 gallon carbon steel holding tank which has been used for the storage of wastes from the 1100/1200 area of Plant A.(5) The tank is 6.5 ft in diameter and 8 ft high.(18) It is currently being used for the storage of product.(17) The tank is in a paved curbed area, with sumps which drain to the wastewater treatment system.(17)

Dates of Operation: The tank came into use as a waste storage tank in 1981, replacing tank T-1218.(18) The tank is an active unit.(17)

Wastes Managed: This unit is used for the storage of wet waste epoxy, industrial process wastewater containing hydrocarbons, and tolyltrazole reactor residues.(2) Wastes in this unit are ignitable.(18)

Release Controls: The tank is in a paved curbed area, with sumps which drain to the wastewater treatment system.(17) It is of closed, fixed roof design, and is equipped with manual waste feed cutoff valves.(18)

History of Releases: There is no documented history of release from this unit. No evidence of release was observed during the VSI.

### 5.12.2 Release Potential

- Soil/Groundwater: Based on the construction and location of the tank, there is no potential for the release of hazardous constituents.

- Surface Water: Based on the construction and location of the tank, there is no potential for the release of hazardous constituents.

- Air: Based on the organic, ignitable wastes managed, there is a low potential for the release of hazardous constituents during maintenance and cleaning.

- Subsurface Gas: Based on the above ground construction and location of the tank, there is no potential for the release of hazardous constituents.

## 5.13 SWMU #13 - TANK T-105

### 5.13.1 Information Summary

Unit Description: This 8,000 gallon carbon steel tank is located in the 100 Area.(5) It is on a concrete foundation is a curbed plant process area, with sumps that drain to the wastewater treatment system.(17) The tank is 12 ft in diameter and 14.5 ft high. Wastes may be piped to Tank 107 or directly to tanker trucks for off-site disposal.(18) The tank is only intermittently used for the storage of wastes. Otherwise, it is used as a product storage tank.(17)

Dates of Operation: This is an active unit.(17)

Wastes Managed: This unit receives alkaline wastewater, industrial process wastewater containing unspecified hydrocarbons, reactor vessel washwater, caustic wastes, sodium chloride brine, organic acids, and tolyltriazole reactor residues.(2) Wastes in this tank are ignitable.(18)

Release Controls: The closed, fixed roof tank is located on a concrete foundation in a diked area, with sumps which drain to the wastewater treatment system.(17) The tank is equipped with manual waste feed cutoff valves.(18)

History of Releases: There is no documented history of releases from this unit. No evidence of release was seen during the VSI.(17)

### 5.13.2 Release Potential

- Soil/Groundwater: Based on the location and construction of this unit, there is no potential for the release of hazardous constituents.

- Surface Water: Based on the location and construction of this unit, there is no potential for the release of hazardous constituents.

- Air: Based on the organic, ignitable wastes managed, there is a low potential for the release of hazardous constituents during maintenance and cleaning.

- Subsurface Gas: Based on the aboveground location and construction of this unit, there is no potential for the release of hazardous constituents.

## 5.14 SWMU #14 - TANK T-107

### 5.14.1 Information Summary

Unit Description: This 11,500 gallon carbon steel tank is located in the 100 Area of Plant A.(5) It is constructed on a concrete foundation and located in a curbed area with sumps which drain to the wastewater treatment system.(5,17) The tank is 12 ft in diamter and 15 ft high. Wastes may be pumped directly to the tank from process areas or from tank T-105.(18) This tank is only intermittently used for the storage of wastes; it is otherwise used for product storage.

Dates of Operation: The startup date of this unit is unknown. This is an active unit.(17)

Wastes Managed: This unit receives wastes from various production processes in Plant A. These wastes include alkaline wastewater, industrial process wastewater containing unspecified hydrocarbons, reactor vessel washwater, caustic wastes, sodium chloride brine, organic acids, and tolyltriazole reactor residues.(2) Wastes in this tank are ignitable.(18)

Release Controls: The tank is on a concrete foundation in a curbed area, with sumps which drain to the wastewater treatment system. It is of closed, fixed roof design, and is equipped with manual waste feed cutoff valves.(18)

History of Releases: There is no documented history of release from this unit. No evidence of release was seen during the VSI.

### 5.14.2 Release Potential

- Soil/Groundwater: Based on the location and construction of this unit, there is no potential for the release of hazardous constituents.

- Surface Water: Based on the location and construction of this unit, there is no potential for the release of hazardous constituents.

- Air: Based on the organic, ignitable wastes managed, there is a low potential for the release of hazardous constituents during maintenance and cleaning.

- Subsurface Gas: Based on the aboveground location and construction of this unit, there is no potential for the release of hazardous constituents.

## 5.15 SWMU #15 - TANK T-305

### 5.15.1 Information Summary

Unit Description: This 10,000 gallon carbon steel tank is located in the 300 area of Plant A. It is constructed on a concrete foundation and located in a curbed area with sumps which drain to the wastewater treatment system.(5,17) The tank is 10 ft in diameter and 19 ft high. Wastes are pumped to the tank and periodically removed by tanker truck.(18) This tank is only intermittently used for the storage of wastes; it is otherwise used for product storage.

Dates of Operation: The date of startup is unknown. This is an active unit. (17)

Wastes Managed: This unit receives wastes from various production processes in Plant A. These wastes include alkaline wastewater, industrial process wastewater containing unspecified hydrocarbons, reactor vessel washwater, caustic wastes, and sodium chloride brine.(2) Wastes in this unit are ignitable.(18)

Release Controls: The tank is constructed on a concrete foundation and located in a curbed area with sumps which drain to the wastewater treatment system. (5,17) It is of closed, fixed roof design, and is equipped with manual waste feed cutoff valves.(18)

History of Releases: There is no documented history of release from this unit. No evidence of release was seen during the VSI.

### 5.15.2 Release Potential

- Soil/Groundwater: Based on the location and construction of this unit, there is no potential for the release of hazardous constituents.

- Surface Water: Based on the location and construction of this unit, there is no potential for the release of hazardous constituents.

- Air: Based on the organic, ignitable wastes managed, there is a low potential for the release of hazardous constituents during maintenance and cleaning.

- Subsurface Gas: Based on the aboveground location and construction of this unit, there is no potential for the release of hazardous constituents.

## 5.16 SWMU #16 - TANK T-335

### 5.16.1 Information Summary

Unit Description: Tank T-335 is located within Plant B, in a tank farm with a number of feedstock and product tanks. It is used for the storage of hazardous waste generated from the Plant B production processes. This tank is the only tank on the facility which is dedicated to the storage of waste materials. (17) The tank is constructed of stainless steel, and has a 10,000 gallon capacity.(5) The tank is 11.2 ft in diameter and 16.2 ft high.(18) It is located on a concrete foundation within an unpaved area. The entire tank farm is surrounded by earthen or oystershell berms approximately four feet high. (5,17)

Dates of Operation: This unit is presumed to have come into use when operations first commenced at Plant B in 1974. This is an active unit.(17)

Wastes Managed: Wastes managed in this unit include industrial process wastewater containing unspecified hydrocarbons, unspecified organic chemicals, and waste organic acids.(5,17) Reactor vessel residues in this tank have been found to contain 42 ppm chromium.(18)

Release Controls: The tank is a closed, fixed roof unit. It is set on a concrete pad, but is not individually bermed or diked.(17) Soil surrounds the concrete foundation. The tank is equipped with manual feed cutoff valves.(18)

History of Releases: There is no documented release history for this unit. There was minor evidence of staining on the tank at the time of the VSI.(17)

### 5.16.2 Release Potential

- Soil/Groundwater: If the tank overflows, or spillage occurs during transfer of contents, there is a low potential for the release of hazardous constituents to soil and possibly groundwater. This is due to the presence of soil around the concrete foundation.

- Surface Water: Because the entire tank farm is surrounded by a berm, there is no potential for the release of hazardous constituents from this tank to surface water.

- Air: There is a low potential for the release of hazardous constituents to air from this unit, because the tank is vented, and may contain volatile constituents.

- Subsurface Gas: There is no potential for subsurface gas generation because this unit is aboveground on a concrete platform.

## 5.17 SWMU #17 - DRUM WASH AREA

### 5.17.1 Information Summary

Unit Description: The drum wash area is located centrally in Plant A. This inactive unit is constructed of concrete and surrounded by a six inch concrete curb with a central sump which is pumped to tank T-107.(17) This area was used for the triple rinsing of drums prior to off-site disposal or recycling. (6)

Dates of Operation: The drum wash area was constructed in the early 1970s. The facility ceased washing drums in 1983.(17)

Wastes Managed: Drums which contained unspecified acids, caustics, and some organic chemicals were washed in this unit.(6)

Release Controls: The unit is constructed of concrete, surrounded by curbing, and is equipped with a sump to divert wastes to tank T-107 or the wastewater treatment system.(6,17)

History of Releases: A 1984 TDWR inspection report indicates that the sump in this wash area showed "signs of corrosion".(8) The entire unit appeared to be in good condition at the time of the VSI.

### 5.17.2 Release Potential

- Soil/Groundwater: There is a moderate potential for past releases from this unit, if the sump in the wash area had cracks or leaks. There is no ongoing potential for release, as the unit is inactive.

- Surface Water: Based on the location and construction of this unit, there is no potential for surface water releases.

- Air: The potential for past releases to air cannot be evaluated without additional information regarding the wastes managed in this unit. There is no ongoing release potential, as this unit is inactive.

- Subsurface Gas: There is a low potential for past gas generation from this unit from organic chemical constituents, if the sump in the wash area had cracks or leaks. There is no ongoing potential for release, as the unit is inactive.

### 5.18 SWMU #18 - TEMPORARY DRUM STORAGE AREA

#### 5.18.1 Information Summary

Unit Description: Located west of the Drum Wash Area (SWMU #17), is a 20 ft x 30 ft area which was being used for the temporary storage of drums at the time of the VSI. Approximately 21 drums were located here, waiting off-site reconditioning.(17) The area in which the drums were located was underlain by concrete.(17)

Dates of Operation: This is an active unit; it is unknown how long drums may have been stored in this area.(17)

Wastes Managed: According to the facility, the drums contained unspecified solidified waste materials. Several of the drums were empty.(17)

Release Controls: This area is underlain by concrete pavement which was in good condition at the time of the VSI. No other release controls were observed.(17)

History of Releases: There is no documented history of release from this unit.(17)

#### 5.18.2 Release Potential

- Soil/Groundwater: Because the unit is underlain by concrete in good condition, there is a very low potential for the release of hazardous constituents to soil or groundwater. In addition, all wastes have been solidified.

- Surface Water: Based on the location of this unit within Plant A, there is no potential for the release of hazardous constituents to surface water.

- Air: Based on the good condition of the drums during the VSI and the solidified nature of the contents of the drums, there is no potential for the release of hazardous constituents to air.

- Subsurface Gas: There is no potential for the generation of subsurface gas, as this is an aboveground unit which is located on concrete.

## 5.19 SWMU #19 - SPRAY DRYER AND BAGHOUSE

### 5.19.1 Information Summary

Unit Description: The Spray Dryer and Associated Baghouse was used for the drying of unspecified materials produced at Plant A. The unit is a Cyclone dryer; it is located on concrete within a bermed area. The process capacity of this unit could not be identified during the VSI. The unit is now used in drill mud production and no longer produces a dusty waste. When the unit was actively used for drying, dusts produced were collected in an associated baghouse and placed into hoppers. The wastes were periodically removed and taken to a Class II landfill.(17)

Dates of Operation: The unit was built in 1970 or 1971; it became inactive in the early 1980s.(17)

Wastes Managed: The wastes managed in the baghouse are not known, as the materials were not specified by the facility during the VSI.(17)

Release Controls: The unit is fully enclosed, and is located on a concrete pad within a bermed area of Plant A.(17)

History of Releases: There is no documented history of releases from this unit. No evidence of release was observed during the VSI.(17)

### 5.19.2 Release Potential

- Soil/Groundwater: Based on the fully enclosed and contained nature of the unit, there is no past potential for releases to soil or groundwater. Because the unit is no longer used for waste storage, there is no remaining potential for releases.

- Surface Water: Based on the fully enclosed and contained nature of the unit, there is no past potential for releases to surface water. Because the unit is no longer used for waste storage, there is no remaining potential for releases.

- Air: There was a high potential for air releases from this unit during its normal operation. There is no remaining potential as the unit is no longer used for the same purpose.

- Subsurface Gas: Based on the fully enclosed and contained nature of the unit, there is no past potential for generation of subsurface gas. Because the unit is no longer used for waste storage, there is no remaining potential for releases.

### 5.20 SWMU #20 - TWO PLANT A SANDBOXES

#### 5.20.1 Information Summary

Unit Description: Two sandboxes are located at the Plant A loading/unloading areas where products are removed from storage and readied for transportation. These two areas consist of a concrete base, curbed area filled with sand which surrounds the valve pits for truck transfer areas. The curbed areas are approximately 5 ft x 10 ft with 6 inch high curbs.(17) The boxes are designed to retain leaks from minor spills occurring when hose connections are changed at the pipes. When the sand becomes saturated, it is shovelled into drums which are taken to the Container Storage Building (SWMU #22). New sand is then brought in.

Dates of Operation: The initial dates of use of this unit are unknown. The sanboxes are actively used.(17)

Wastes Managed: The sandboxes may receive material from any of the products made in the Plant A area. These products all contain complex hydrocarbons, and may be highly acidic, caustic, or ignitable.(17) However, these wastes are very viscous and solidify with exposure to air.

Release Controls: The areas are underlain by concrete and surrounded by 6-inch high curbs.(17)

History of Releases: There is no documented history of release. No evidence of release was seen during the VSI.

#### 5.20.2 Release Potential

- Soil/Groundwater: There is a low potential for the release of hazardous constituents because the unit is located on a concrete slab, is curbed, and is within a diked plant area.

- Surface Water: There is a low potential for the release of hazardous constituents because the unit is located on a concrete slab, is curbed, and is within a diked plant area. In addition, the collected hazardous wastes are in a solidified state.

- Air: There is a low potential for air release from any volatile constituents in the products spilled. The material is very viscous and binds the sand; therefore, there is no known potential for particulate release.

- Subsurface Gas: There is no known potential for subsurface gas generation from this unit because of the aboveground nature of the unit.

## 5.21 SWMU #21 - PLANT B TRUCK TRANSFER AREA

### 5.21.1 Information Summary

Unit Description: The truck transfer area is located in the southwest corner of Plant B and is the area where both wastes and products are transferred from storage tanks to tanker trucks. The transfer pad, which is approximately 5 ft x 5 ft, is constructed of concrete. It is without curbing or other secondary containment. Any liquids on the pad drain to an unlined ditch, which eventually reaches the West Sump and Ditch (SWMU #3).(17)

Dates of Operation: The area has probably been used since Plant B opened in 1974. It is an active unit.(17)

Wastes Managed: The wastes managed in this unit include the contents of Tank 335 (SWMU #16) and any product spillage of dibasic acids from product storage tanks.(17)

Release Controls: There are no release controls for this unit, other than that it is located within the facility's stormwater control area.

History of Releases: There is no documented history of release from this unit. During the VSI, liquid with an oily sheen was observed at the edge of the pad and running in the unlined ditch.(17)

### 5.21.2 Release Potential

- Soil/Groundwater: Apparent soil releases were noted during the VSI. There is a high potential for ongoing releases to soil and groundwater based on the observations during the VSI, and the unlined nature of the ditch adjacent to the transfer pad.

- Surface Water: The unit is within the stormwater control area of Plant B. There is no apprent potential for the release of hazardous constituents to surface water from this unit.

- Air: Based on the concentrated nature of both products and wastes managed at this unit, there is a low potential for release of hazardous constituents to air.

- Subsurface Gas: Based on the presence of hydrocarbons in wastes managed in this unit and the ongoing release to soil, there is a low to moderate potential for the generation of subsurface gas, if anaerobic conditions are created.

## 5.22 SWMU #22 - CONTAINER STORAGE BUILDING

### 5.22.1 Information Summary

Unit Description: Drum storage of hazardous wastes is located inside a prefabricated metal building located in the south portion of Plant A. The building is constructed on a concrete slab and has metal walls and roof.(5,17) It is not curbed around the inside. The hazardous waste drum storage portion of the building occupies approximately 300 square feet of the building (storage for 80 drums).(5)

Dates of Operation: It is unknown when this unit was constructed. This is an active unit.(17)

Wastes Managed: This area is used to store drums of unspecified hazardous wastes. Drum storage has been used for sand from the sandboxes (SWMU #20) and other unknown RCRA wastes.(17) Wastes in the drums are solidified.

Release Controls: The drums are contained inside a building with a bermed loading dock.(17)

History of Releases: At the time of the VSI, all drums were in good condition and no staining was evident on the floor.(17)

### 5.22.2 Release Potential

- Soil/Groundwater: Based on the location and good condition of the drums as observed during the VSI and the solidified state of the drum contents, there is no potential for soil or groundwater release from this building.

- Surface Water: Based on the location and good condition of the drums as observed during the VSI, there is no potential for surface water release from this building.

- Air: Based on the location and good condition of the drums as observed during the VSI and the solidified state of the drum contents, there is no potential for air release from this building.

- Subsurface Gas: Based on the location and good condition of the drums as observed during the VSI, there is no potential for subsurface gas generation from wastes stored in this building.

## 5.23 SWMU #23 - BONEYARD

### 5.23.1 Information Summary

Unit Description: Located to the west of the Aeration Basins (SWMU #10) is an unpaved area used for the storage of scrap metals and salvaged equipment. At the time of the VSI, only inert materials were stored here.(17)

Dates of Operation: This is an active unit; the first dates of use are not known.(17)

Wastes Managed: The wastes in this area are inert scrap metals and salvaged equipment. There are no known hazardous wastes or constituents present.(17)

Release Controls: There are no release controls associated with this unit.(17)

History of Releases: There is no documented history of releases from this unit. No evidence of release was seen during the VSI.

### 5.23.2 Release Potential

- Soil/Groundwater: There are no hazardous constituents present in this unit; therefore, there is no potential for releases.

- Surface Water: There are no hazardous constituents present in this unit; therefore, there is no potential for releases.

- Air: There are no hazardous constituents present in this unit; therefore, there is no potential for releases.

- Subsurface Gas: There are no hazardous constituents present in this unit; therefore, there is no potential for releases.

## HRS DOCUMENTATION LOG SHEET

| | |
|---|---|
| **SITE:** | Dixie Chemical Company |
| **IDENTIFICATION NUMBER:** | TXD008088247 |
| **CITY:** | Pasadena |
| **STATE:** | Texas |

| REFERENCE NUMBER | DESCRIPTION OF THE REFERENCE |
|---|---|
| 1 | U. S. Environmental Protection Agency Draft Final Rule Revised Hazard Ranking System. February 15, 1990. |
| 2 | Sampling Visit Report of Dixie Chemical Company. Prepared by A.T. Kearney, Inc. for U.S. Environmental Protection Agency, Region VI. November 1987. |
| 3 | RCRA Facility Assessment PR/VSI Report of Dixie Chemical Company. Prepared by A.T. Kearney, Inc. for U.S. Environmental Protection Agency, Region VI. August 1987. |
| 4 | Clean Closure Report Review of Dixie Chemical Company. Prepared by A. T. Kearney for U.S. Environmental Protection Agency, Region VI. December 1988. |
| 5 | Closure Ground Water Monitoring Report of Dixie Chemical Company, Bayport Facility, ISW Registration #30314. Prepared by S & B Engineers, Inc. for Dixie Chemical Company. March 25, 1986. |
| 6 | Permit Application for Industrial Solid Waste Storage/ Processing/Disposal Facility for the Dixie Chemical Company. Prepared by the Texas Department of Water Resources for Dixie Chemical Company. August 15, 1980. |
| 7 | Record of Communication. Sensitive Environments Near Taylor Bayou, Taylor Lake and Clear Lake. From: Warren P. Mitchell, FIT Biologist, ICF Technology, Inc., U.S. EPA Region VI. To: Brenda Bowling, Biologist, Texas Parks and Wildlife. January 25, 1990. TXD008088247 |
| 8 | Record of Communication. Determination of Where the Waste Water of the Industrial District Is Dispersed from the GCWDA. From: Warren P. Mitchell, FIT Biologist, ICF Technology, Inc., U.S. EPA Region VI. To: Steve Spencer, Biologist III, Texas Parks and Wildlife. January 25, 1990. TXD008088247 |

9 Record of Communication. Status of the Armand Bayou Nature Center. From: Warren P. Mitchell, FIT Biologist, ICF Technology, Inc., U.S. EPA Region VI. To: Marsha Allen, Armand Bayou National Park, Pasadena, Texas. January 3, 1990. TXD008088247

10 Record of Communication. Use of the Taylor Bayou. From: Warren P. Mitchell, FIT Biologist, ICF Technology, Inc., U.S. EPA Region VI. To: Don Pitts, Texas Parks and Wildlife Department, Pasadena, Texas. January 3, 1990. TXD008088247

11 Record of Communication. Nearest Homes, Parks and Surface Water Bodies in the Pasadena Area. From: Warren P. Mitchell, FIT Biologist, ICF Technology, Inc., U.S. EPA Region VI. To: Joyce Nelson, Chamber of Commerce, Pasadena, Texas. January 2, 1990. TXD008088247

12 Record of Communication. The Number of Employees at the Dixie Chemical Company. From: Warren P. Mitchell, FIT Biologist, ICF Technology, Inc., U.S. EPA Region VI. To: Caroline Watkins, Personnel Department, Dixie Chemical Company. December 29, 1989. TXD008088247

13 U.S.G.S. 7.5 Minute Series Topographic Map. LaPorte, Texas. 1982. League City, Texas. 1982. Baycliff, Texas. 1982. Morgan's Point, Texas. 1982.

14 Record of Wells in Harris County, Area 8. Texas Department of Health, Public Health Region VI.

15 Record of Communication. Public Water Source for Clear Lake City, Texas. From: Pam Fetzer, FIT Geologist, ICF Technology, Inc., U.S. EPA Region VI. To: Will Moberly, Biologist, Texas Parks and Wildlife. May 2, 1990. TXD008088247

16 U. S. Department of Commerce, Bureau of the Census. Estimates of Households for Counties: July 1, 1985.

17 Endangered and Threathened Species of Texas and Oklahoma. Prepared by the Albuquerque Regional Office of the U. S. Fish and Wildlife Service for the Texas Parks and Wildlife Department. 1987.

**Reference 1**

# DRAFT FINAL RULE
# HAZARD RANKING SYSTEM

February 15, 1990

**Reference 2**

SAMPLING VISIT REPORT

[redacted]

PASADENA, TEXAS

EPA I.D. No. [redacted]

Prepared for:

U.S. Environmental Protection Agency
Region VI
1445 Ross Avenue
Dallas, Texas 75202

Prepared by:

A.T. Kearney, Inc.
3 Lagoon Drive, Suite 170
Redwood City, California 94065

and

Science Applications International Corporation
13400-B Northup Way, Suite 38
Bellevue, Washington 98005

EPA Contract No. 68-01-7374
A.T. Kearney Work Assignment No. R26-01-36
SAIC Project No. 2-817-08-042-00



November 1987

TABLE OF CONTENTS

# 1.0 INTRODUCTION

## 1.1 PURPOSE OF THE REPORT

The 1984 Hazardous and Solid Waste Amendments (HSWA) provide new authority to EPA to require comprehensive corrective actions on solid waste management units (SWMUs) and other areas of concern at interim status hazardous waste management facilities, particularly those applying for RCRA permits. These corrective actions are intended to address unregulated releases of hazardous constituents to air, surface water, soil, and groundwater, as well as the generation of subsurface gas. One of the major segments of EPA's corrective action program consists of RCRA Facility Assessments (RFAs) to identify releases or potential releases requiring further investigation. The three basic steps of an RFA consist of a preliminary review (PR) of file information, a visual site inspection (VSI) to obtain additional information on releases and, if necessary, a sampling visit to fill data gaps by obtaining field and analytical data.

This report presents the results of the sampling visit to the Dixie Chemical Company near Pasadena, Texas. It is provided as an addendum to the PR/VSI report completed in August, 1987. A VSI was conducted by the A.T. Kearney team on July 14, 1987. The Dixie Chemical Company representative present was John Perrin, Environmental Specialist. The A.T. Kearney team representatives were Patricia O'Flaherty and Barry Langer of SAIC.

The PR/VSI report recommended soil sampling at three SWMUs; EPA Region VI approved the recommended soil sampling. The sampling visit was conducted on July 16, 1987. A.T. Kearney team members present were Patricia O'Flaherty, Brett Freier and Mark Allen of SAIC.

Dixie Chemical Corporation, located approximately two miles south of Pasadena, Texas, is a service chemical company engaged in the manufacture, formulation, and packaging of chemicals on a demand basis for a wide variety of customers. The facility has manufactured glycols, ketones, epoxy compounds, and glycidol, and has formulated drill muds and other oil field chemicals. Chemicals being formulated or manufactured change on a frequent basis, depending on market demand.

## 1.2 CONTENTS OF THIS REPORT

Section 2.0 of this report describes the sampling activities in detail. Section 3.0 presents the analytical results of sampling, and Section 4.0 includes conclusions and suggestions for further action for each SWMU and Area of Concern. The Sampling Visit Photo Log is presented in Appendix A.

## 2.0 SAMPLING VISIT

### 2.1 DESCRIPTION OF VISIT

On July 16, 1987, A.T. Kearney team participants, Patricia O'Flaherty, Brett Freier, and Mark Allen, collected soil samples from the Dixie Chemical Company Bayport facility near Pasadena, Texas. The team arrived at the site at 1:00 p.m. and briefly dicussed the sampling effort with the facility representative, John Perrin. The samples were collected between 1:00 and 3:30 p.m., with sample packing occurring between 3:30 and 5:00 p.m. The day was hot and very humid with temperatures over 90°F. A thunderstorm had occurred approximately one-half hour prior to collecting the samples; no standing water was present in the vicinity of the SWMUs sampled. No significant or unusual events were observed during this sampling visit.

### 2.2 SAMPLING ACTIVITIES

A total of five soil samples and one equipment blank were collected by the sampling crew. Table 2.1 summarizes sampling information including sample identification number, sample description, and sample location. Figures 2.1 and 2.2 show sample locations. The samples were analyzed for volatile and semivolatile organic compounds.

#### 2.2.1 Sample Locations

Sample FF 275 was collected 30 feet southwest of the Plant B office building to serve as a background soil sample. According to facility personnel, no waste management activities or other operations have occurred at this location. The background sample was chosen so that the soil type and texture (as evaluated visually in the field) was similar to that of the planned SWMU samples. In addition, the background sample location was south of the office building, upwind of the prevailing wind direction, minimizing the potential for surface contamination from any air releases from process areas in the manufacturing portion of the facility.

Sample FF 276 was collected in a unlined ditch in the Plant B area adjacent to the truck transfer area (SWMU #21). The truck transfer area consists of an

Table 2.1

SUMMARY OF SAMPLING ACTIVITIES AT
DIXIE CHEMICAL CORPORATION
PASADENA, TEXAS

| | Background | SWMU #4 | SWMU #16 | SWMU #21 |
|---|---|---|---|---|
| SWMU Name | SW of Office | Area 100 South Ditch | Tank T-335 | Truck Transfer Area |
| Media Sampled | Soil | Soil | Soil | Soil |
| Date/Time Sampled | 7/16/87 1420 hours | 7/16/87 1545 hours | 7/16/87 1520 hours | 7/16/87 1500 hours |
| Sampling Method | Composite[1] | Grab | Grab | Grab |
| Sample Depth | 2-15 cm depth | 2-15 cm depth | 2-15 cm depth | 2-15 cm depth |
| Type of Container Used | D, G | D, G | D, G | D, G |
| Sample Equipment Used | Dedicated stainless hand auger | Dedicated stainless steel spoons | Dedicated stainless steel spoons | Dedicated stainless steel spoons |
| Analyses Requested | Extractable organic/VOC; RAS[2] | Extractable organic/VOC; RAS2 | Extractable organic/VOC; RAS[2] | Extractable organic/VOC; RAS[2] |
| Sample Identification No. | FF 275 | FF 278/279 | FF 277 | FF 276 |
| Preservative Used | None | None | None | None |

---

[1] Composite sample was collected as follows: A one-foot boring was made, and a stainless steel spoon used to grab samples from the sides of the boring. Grabs were composited directly into the sample container.

[2] VOC = Volatile Organic Compound
RAS = Routine Analytical Services

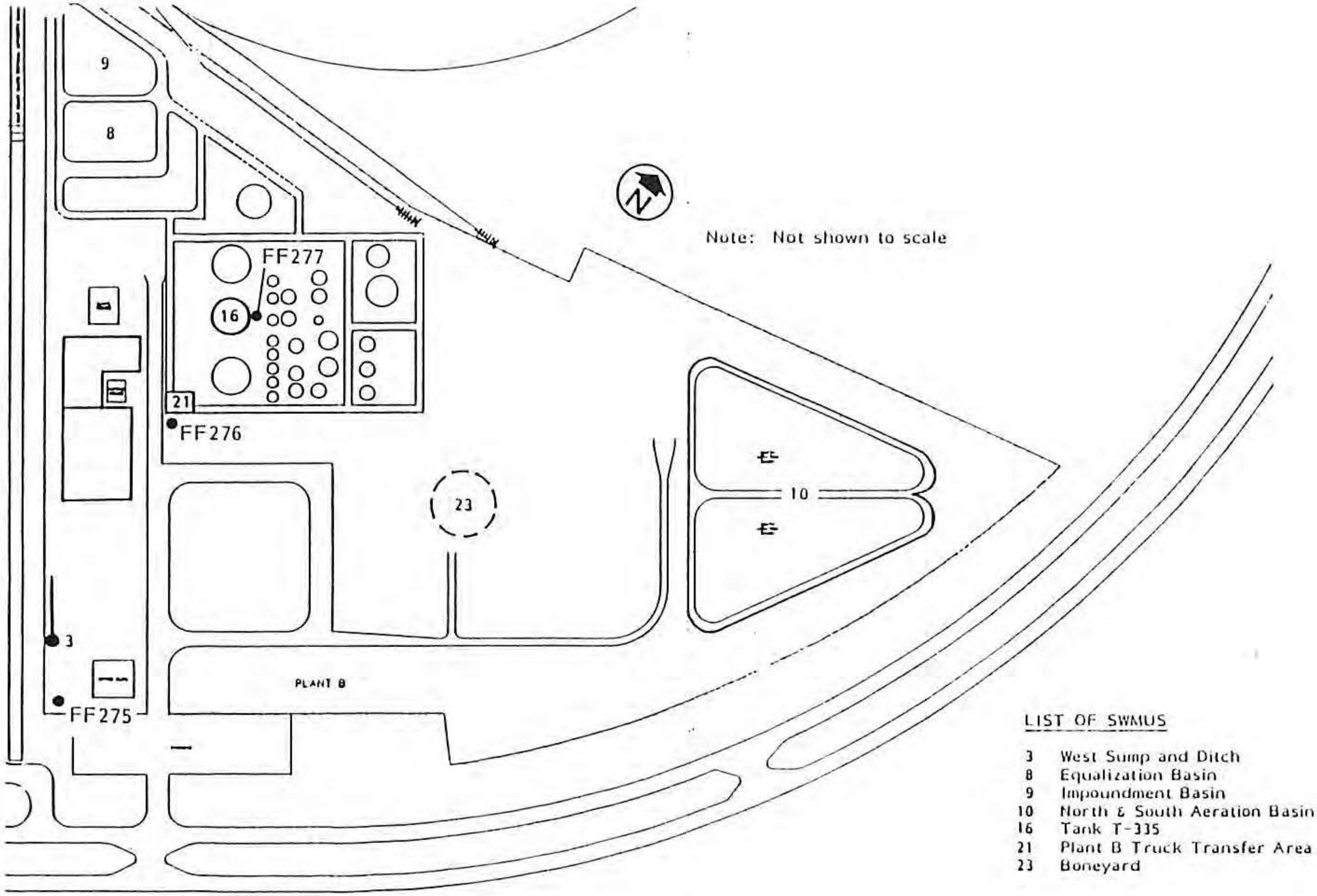



Figure 2.1

LOCATION OF SOIL SAMPLING SITES IN RELATION TO SWMUS IN PLANT B AT DIXIE CHEMICAL COMPANY
Source: Visual Site Inspection, 7/14/87.

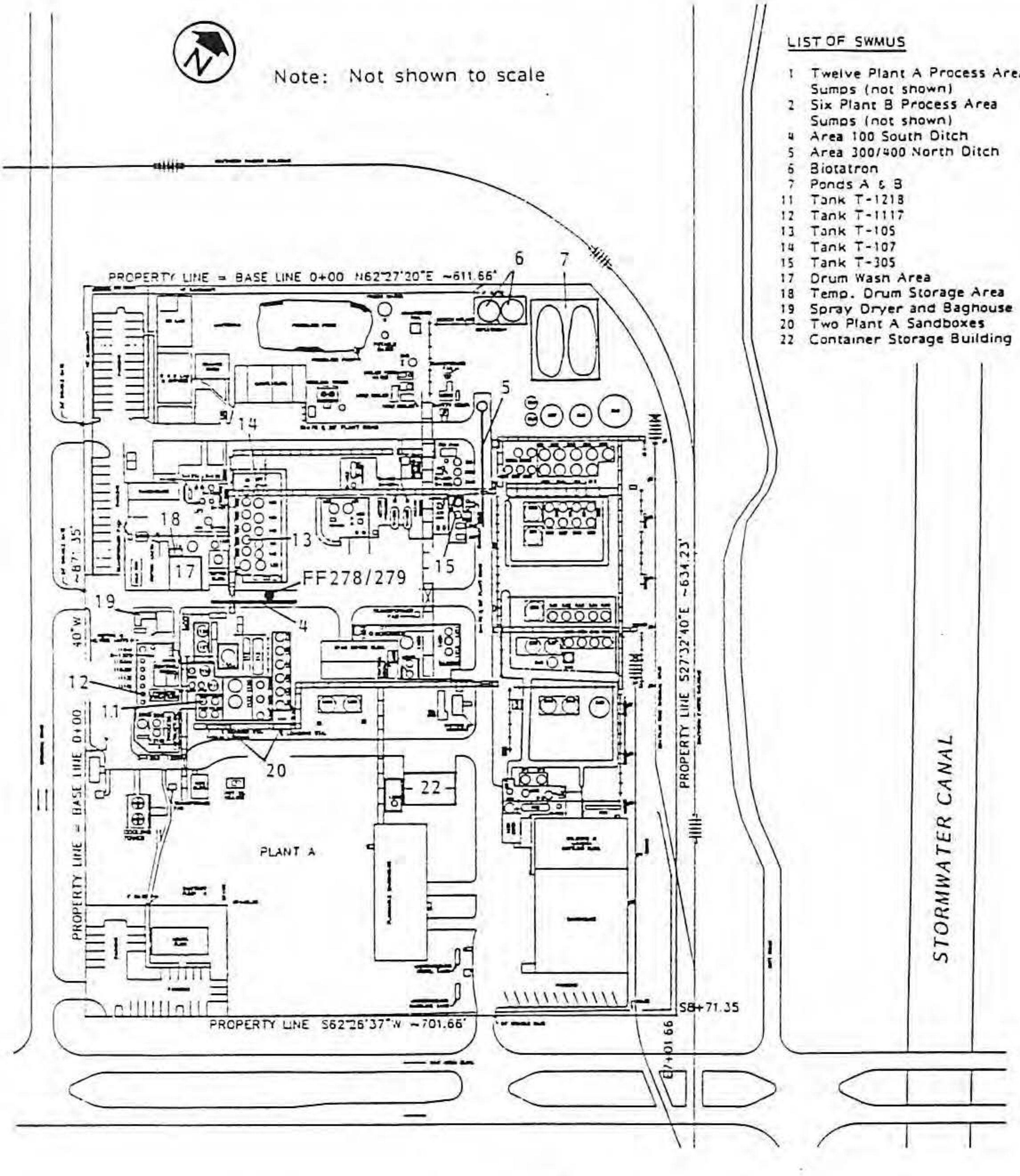



Figure 2.2

LOCATION OF SOIL SAMPLING SITES IN RELATION TO SWMUS
IN PLANT A AT DIXIE CHEMICAL COMPANY
Source: Visual Site Inspection, 7/14/87.

uncurbed concrete pad where wastes and products are transferred from storage tanks to tanker trucks. Any spillage occurring in this transfer area would drain into the drainage ditch.

Sample FF 277 was collected within the Plant B tank farm area, from an unpaved area adjacent to the concrete pad underlying Tank T-335 (SWMU #16). Tank T-335 is used for storage of hazardous wastes generated from the Plant B production processes. The concrete pad underlying Tank T-335 is uncurbed and as a result, spillage or overflow from the tank would likely be released onto the unpaved area.

Sample FF 278 was collected from an unlined ditch in the Plant A area, just south of Area 100 tank farm. The ditch (SWMU #4) collects process wastewater and storm runoff from the adjacent Area 100 and discharges into a wastewater treatment system via a sump.

Sample FF 279 was collected from the same location as Sample FF 278 to serve as a duplicate sample.

2.2.2 Sampling Procedures

The background soil sample (FF 275) was collected by augering a 3-foot hole with a stainless steel hand auger, then using a stainless steel spoon to collect grab samples on the side of the hole. These grab samples were composited directly to the sample container and mixed in the container. The remaining four soil samples were collected with dedicated stainless steel sampling spoons. At each sample location, the top one-half to one inch of soil was removed and discarded prior to collecting the sample. The sample was collected between 2 and 15 cm depth.

Sampling containers consisted of 8 oz. and 4 oz. glass jars which were cleaned and prepared by a contract lab. At each sample location, one 8 oz. sample container was filled for the semivolatile organic compound analyses and two 4 oz. sample containers were filled for the volatile organic compound analyses. Additional sample volumes were collected at these locations for analyses by the facility. The samples were collected in such a manner so as to minimize disturbance and eliminate headspace in the sample containers.

At the time of collection, the samples were labeled, sealed, and stored on ice in a 40-gallon plastic cooler. The samples were hand delivered to the contract lab in Houston during the morning of July 17, 1987. Appropriate chain-of-custody forms were filled out prior to sample shipping. All sample collection, storage, and shipping activities were performed in such a manner as to maintain sample integrity.

Decontamination of sampling equipment was carried out by scrubbing the spoons and auger in a soap solution, rinsing in tap water and rinsing again in deionized water. No solvents were used at the site by the sampling team. Wash and rinse water were disposed to the sanitary sewer with approval of the facility.

## 2.3 SAMPLING QC PROCEDURES

An equipment blank (Sample FF 274) was also collected by the sampling team. This sample consisted of distilled water which was received from the contract lab. The distilled water was collected in one 4-liter glass container for the semivolatile organic compound analyses and two 40-ml glass containers for the volatile organic compound analyses. The samples were labeled, sealed, stored, and shipped in the same manner as the soil samples.

A background sample was collected in an area identifed by the facility as never having been utilized for waste management activies or production activities, and which was similar in soil texture to the planned SWMU soil samples. A duplicate sample was collected of the sample hypothesized to be most contaminated.

Sampling was conducted with dedicated stainless steel spoons, eliminating the need to decontaminate equipment between sampling locations.

# 3.0 ANALYTICAL RESULTS SUMMARY

Laboratory analyses were performed by Spectrix-Houston in accordance with the methods specified in the EPA Contract Laboratory Program, Revision 785, EPA Contract No. 7419. All samples were submitted through the Routine Analytical Services (RAS) Program. The laboratory analyses were performed according to the standard methods and QA/QC protocols detailed in SW-846, "Test Methods for Evaluating Solid Waste'" Third Edition (EPA, November, 1986). Laboratory results are presented in the following tables.

Table 3.1

SAMPLING INFORMATION

DIXIE CHEMICAL COMPANY, PASADENA, TEXAS

| Sample Number | Sample Description | Sample Location | Sample Date |
|---|---|---|---|
| FF 274 | Equipment Blank (water) (B101) | | 7/16/87 |
| FF 275 | Soil (Background) (B102) | Southwest of Plant B Office Building | 7/16/87 |
| FF 276 | Soil (B103) | Ditch at Truck Transfer Point | 7/16/87 |
| FF 277 | Soil (B104) | East of Tank 335 | 7/16/87 |
| FF 278 | Soil (A105) | South Ditch-Adjacent Area 100 Tank Farm | 7/16/87 |
| FF 279 | Soil (A106) (Duplicate) | South Ditch Adjacent Area 100 Tank Farm | 7/16/87 |

Table 3.2

ANALYTICAL RESULTS FOR SAMPLE NO. FF 274
VOLATILE COMPOUNDS

| Compound | Concentration (ug/l) |
|---|---|
| Chloromethane | 200. U |
| Bromomethane | 200. U |
| Vinyl Chloride | 200. U |
| Chloroethane | 200. U |
| Methylene Chloride | 1400. |
| Acetone | 200. U |
| Carbon Disulfide | 100. U |
| 1,1-Dichloroethene | 100. U |
| 1,1-Dichloroethane | 100. U |
| Trans-1,2-Dichloroethene | 100. U |
| Chloroform | 100. U |
| 1,2-Dichloroethane | 100. U |
| 2-Butanone | 200. U |
| 1,1,1-Trichloroethane | 100. U |
| Carbon Tetrachloride | 100. U |
| Vinyl Acetate | 200. U |
| Bromodichloromethane | 100. U |
| 1,2-Dichloropropane | 100. U |
| Trans-1,3-Dichloropropene | 100. U |
| Trichloroethene | 100. U |
| Dibromochloromethane | 100. U |
| 1,1,2-Trichloroethane | 100. U |
| Benzene | 100. U |
| cis-1,3-Dichloropropene | 100. U |
| 2-Chloroethylvinylether | 200. U |
| Bromoform | 100. U |
| 4-Methyl-2-Pentanone | 200. U |
| 2-Hexanone | 200. U |
| Tetrachloroethene | 100. U |
| 1,1,2,2-Tetrachloroethane | 100. U |
| Toluene | 100. U |
| Chlorobenzene | 100. U |
| Ethylbenzene | 100. U |
| Styrene | 100. U |
| Total Xylenes | 100. U |

U - Compound analyzed for but not detected. The reported value is the minimum attainable detection limit for the sample.

Table 3.3

ANALYTICAL RESULTS FOR SAMPLE NO. FF 274
SEMIVOLATILE COMPOUNDS

| Compound | Concentration (ug/l) |
|---|---|
| Phenol | 10. U |
| bis(2-Chlorethyl)Ether | 10. U |
| 2-Chlorophenol | 10. U |
| 1,3-Dichlorobenzene | 10. U |
| 1,4-Dichlorobenzene | 10. U |
| Benzyl Alcohol | 10. U |
| 1,2-Dichlorobenzene | 10. U |
| 2-Methylphenol | 10. U |
| bis(2-Chloroisopropyl)Ether | 10. U |
| 4-Methylphenol | 10. U |
| N-Nitroso-di-n-Propylamine | 10. U |
| Hexachloroethane | 10. U |
| Nitrobenzene | 10. U |
| Isophorone | 10. U |
| 2-Nitrophenol | 10. U |
| 2,4-Dimethyphenol | 10. U |
| Benzoic Acid | 50. U |
| bis(2-Chloroethoxy)Methane | 10. U |
| 2,4-Dichlorophenol | 10. U |
| 1,2,4-Trichlorobenzene | 10. U |
| Naphthalene | 10. U |
| 4-Chloroaniline | 10. U |
| Hexachlorobutadiene | 10. U |
| 4-Chloro-3-Methyphenol | 10. U |
| 2-Methylnaphthalene | 10. U |
| Hexachlorocyclopentadiene | 10. U |
| 2,4,6-Trichlorophenol | 10. U |
| 2,4,5-Trichlorophenol | 50. U |
| 2-Chloronaphthalene | 10. U |
| 2-Nitroaniline | 50. U |
| Dimethyl Phthalate | 10. U |
| Acenaphthylene | 10. U |
| 3-Nitroaniline | 50. U |
| Acenaphthene | 10. U |
| 2,4-Dinitrophenol | 50. U |
| 4-Nitrophenol | 50. U |
| Dibenzofuran | 10. U |
| 2,4-Dinitrotoluene | 10. U |
| 2,6-Dinitrotoluene | 10. U |
| Diethylphthalate | 10. U |
| 4-Chlorophenyl-phenylether | 10. U |
| Fluorene | 10. U |
| 4-Nitroaniline | 50. U |
| 4,6-Dinitro-2-Methylphenol | 50. U |

Table 3.3 (cont'd)

| Compound | Concentration (ug/l) |
|---|---|
| N-Nitrosodiphenylamine (1) | 10. U |
| 4-Bromophenyl-phenylether | 10. U |
| Hexachlorobenzene | 10. U |
| Pentachlorophenol | 50. U |
| Phenanthrene | 10. U |
| Anthracene | 10. U |
| Di-n-Butylphthalate | 10. U |
| Fluoranthene | 10. U |
| Pyrene | 10. U |
| Butylbenzylphthalate | 10. U |
| 3,3'-Dichlorobenzidine | 20. U |
| Benzo(a)Anthracene | 10. U |
| bis(2-Ethylhexyl)Phthalate | 24. |
| Chrysene | 10. U |
| Di-n-Octyl Phthalate | 10. U |
| Benzo(b)Fluoranthene | 10. U |
| Benzo(k)Fluoranthene | 10. U |
| Benzo(a)Pyrene | 10. U |
| Indeno(1,2,3-cd)Pyrene | 10. U |
| Dibenz(a,h)Anthracene | 10. U |
| Benzo(g,h,i)Perylene | 10. U |

U - Compound analyzed for but not detected. The reported value is the minimum attainable detection limit for the sample.

(1) Cannot be separated from diphenylamine.

Table 3.4

ANALYTICAL RESULTS FOR SAMPLE NO. FF 274
TENTATIVELY IDENTIFIED COMPOUNDS

| Volatile Compound Name | Concentration (ug/l) |
|---|---|
| Furan, tetrahydro- | 160. JB |

B - Compound was detected in QC blank.
J - Estimated value - A 1:1 response factor is assumed.

Table 3.5

ANALYTICAL RESULTS FOR SAMPLE NO. FF 275
VOLATILE COMPOUNDS

| Compound | Concentration (ug/kg) |
|---|---|
| Chloromethane | 12. U |
| Bromomethane | 12. U |
| Vinyl Chloride | 12. U |
| Chloroethane | 12. U |
| Methylene Chloride | 8.4 |
| Acetone | 10. BJ |
| Carbon Disulfide | 6.2 U |
| 1,1-Dichloroethene | 6.2 U |
| 1,1-Dichloroethane | 6.2 U |
| Trans-1,2-Dichloroethene | 6.2 U |
| Chloroform | 6.2 U |
| 1,2-Dichloroethane | 6.2 U |
| 2-Butanone | 8.1 BJ |
| 1,1,1-Trichloroethane | 6.2 U |
| Carbon Tetrachloride | 6.2 U |
| Vinyl Acetate | 12. U |
| Bromodichloromethane | 6.2 U |
| 1,2-Dichloropropane | 6.2 U |
| Trans-1,3-Dichloropropene | 6.2 U |
| Trichloroethene | 6.2 U |
| Dibromochloromethane | 6.2 U |
| 1,1,2-Trichloroethane | 6.2 U |
| Benzene | 6.2 U |
| cis-1,3-Dichloropropene | 6.2 U |
| 2-Chloroethylvinylether | 12. U |
| Bromoform | 6.2 U |
| 4-Methyl-2-Pentanone | 12. U |
| 2-Hexanone | 12. U |
| Tetrachloroethene | 6.2 U |
| 1,1,2,2-Tetrachloroethane | 6.2 U |
| Toluene | 6.2 U |
| Chlorobenzene | 6.2 U |
| Ethylbenzene | 6.2 U |
| Styrene | 6.2 U |
| Total Xylenes | 6.2 U |

B - Compound was detected in QC blank.

J - Reported value is less than the detection limit.

U - Compound analyzed for but not detected. The reported value is the minimum attainable detection limit for the sample.

Table 3.6

ANALYTICAL RESULTS FOR SAMPLE NO. FF 275
SEMIVOLATILE COMPOUNDS

| Compound | Concentration (ug/kg) |
|---|---|
| Phenol | 820. U |
| bis(2-Chlorethyl)Ether | 820. U |
| 2-Chlorophenol | 820. U |
| 1,3-Dichlorobenzene | 820. U |
| 1,4-Dichlorobenzene | 820. U |
| Benzyl Alcohol | 820. U |
| 1,2-Dichlorobenzene | 820. U |
| 2-Methylphenol | 820. U |
| bis(2-Chloroisopropyl)Ether | 820. U |
| 4-Methylphenol | 820. U |
| N-Nitroso-di-n-Propylamine | 820. U |
| Hexachloroethane | 820. U |
| Nitrobenzene | 820. U |
| Isophorone | 820. U |
| 2-Nitrophenol | 820. U |
| 2,4-Dimethyphenol | 820. U |
| Benzoic Acid | 4000. U |
| bis(2-Chloroethoxy)Methane | 820. U |
| 2,4-Dichlorophenol | 820. U |
| 1,2,4-Trichlorobenzene | 820. U |
| Naphthalene | 820. U |
| 4-Chloroaniline | 820. U |
| Hexachlorobutadiene | 820. U |
| 4-Chloro-3-Methyphenol | 820. U |
| 2-Methylnaphthalene | 820. U |
| Hexachlorocyclopentadiene | 820. U |
| 2,4,6-Trichlorophenol | 820. U |
| 2,4,5-Trichlorophenol | 4000. U |
| 2-Chloronaphthalene | 820. U |
| 2-Nitroaniline | 4000. U |
| Dimethyl Phthalate | 820. U |
| Acenaphthylene | 820. U |
| 3-Nitroaniline | 4000. U |
| Acenaphthene | 820. U |
| 2,4-Dinitrophenol | 4000. U |
| 4-Nitrophenol | 4000. U |
| Dibenzofuran | 820. U |
| 2,4-Dinitrotoluene | 820. U |
| 2,6-Dinitrotoluene | 820. U |
| Diethylphthalate | 820. U |
| 4-Chlorophenyl-phenylether | 820. U |
| Fluorene | 820. U |
| 4-Nitroaniline | 4000. U |
| 4,6-Dinitro-2-Methylphenol | 4000. U |

Table 3.6 (cont'd)

| Compound | Concentration (ug/kg) |
|---|---|
| N-Nitrosodiphenylamine (1) | 820. U |
| 4-Bromophenyl-phenylether | 820. U |
| Hexachlorobenzene | 820. U |
| Pentachlorophenol | 4000. U |
| Phenanthrene | 820. U |
| Anthracene | 820. U |
| Di-n-Butylphthalate | 820. U |
| Fluoranthene | 820. U |
| Pyrene | 820. U |
| Butylbenzylphthalate | 820. U |
| 3,3'-Dichlorobenzidine | 1600. U |
| Benzo(a)Anthracene | 820. U |
| bis(2-Ethylhexyl)Phthalate | 820. U |
| Chrysene | 820. U |
| Di-n-Octyl Phthalate | 820. U |
| Benzo(b)Fluoranthene | 820. U |
| Benzo(k)Fluoranthene | 820. U |
| Benzo(a)Pyrene | 820. U |
| Indeno(1,2,3-cd)Pyrene | 820. U |
| Dibenz(a,h)Anthracene | 820. U |
| Benzo(g,h,i)Perylene | 820. U |

U - Compound analyzed for but not detected. The reported value is the minumum attainable detection limit for the sample.

(1) Cannot be separated from diphenylamine.

Table 3.7

ANALYTICAL RESULTS FOR SAMPLE NO. FF 275
TENTATIVELY IDENTIFIED COMPOUNDS

| Volatile Compound Name | Concentration (ug/kg) |
|---|---|
| Furan, tetrahydro- | 10. JB |

| Semivolatile Compound Name | Concentration (ug/kg) |
|---|---|
| 2-Hexanone, 5-methyl- | 2800. JB |
| Octane, 4-methyl- | 1300. J |
| Heptane, 2,3,6-trimethyl- | 1900. J |

---

B - Compound was detected in QC blank.
J - Estimated value - A 1:1 response factor is assumed.

Table 3.8

ANALYTICAL RESULTS FOR SAMPLE NO. FF 276
VOLATILE COMPOUNDS

| Compound | Concentration (ug/kg) |
|---|---|
| Chloromethane | 14. U |
| Bromomethane | 14. U |
| Vinyl Chloride | 14. U |
| Chloroethane | 14. U |
| Methylene Chloride | 6.8 U |
| Acetone | 1500. B |
| Carbon Disulfide | 6.8 U |
| 1,1-Dichloroethene | 6.8 U |
| 1,1-Dichloroethane | 6.8 U |
| Trans-1,2-Dichloroethene | 6.8 U |
| Chloroform | 6.8 U |
| 1,2-Dichloroethane | 6.8 U |
| 2-Butanone | 110. B |
| 1,1,1-Trichloroethane | 6.8 U |
| Carbon Tetrachloride | 6.8 U |
| Vinyl Acetate | 14. U |
| Bromodichloromethane | 6.8 U |
| 1,2-Dichloropropane | 6.8 U |
| Trans-1,3-Dichloropropene | 6.8 U |
| Trichloroethene | 6.8 U |
| Dibromochloromethane | 6.8 U |
| 1,1,2-Trichloroethane | 6.8 U |
| Benzene | 6.8 U |
| cis-1,3-Dichloropropene | 6.8 U |
| 2-Chloroethylvinylether | 14. U |
| Bromoform | 6.8 U |
| 4-Methyl-2-Pentanone | 14. U |
| 2-Hexanone | 14. U |
| Tetrachloroethene | 6.8 U |
| 1,1,2,2-Tetrachloroethane | 6.8 U |
| Toluene | 6.8 U |
| Chlorobenzene | 6.8 U |
| Ethylbenzene | 6.8 U |
| Styrene | 2.8 J |
| Total Xylenes | 6.8 U |

B - Compound was detected in QC blank.

J - Reported value is less than the detection limit.

U - Compound analyzed for but not detected. The reported value is the minimum attainable detection limit for the sample.

Table 3.9

ANALYTICAL RESULTS FOR SAMPLE NO. FF 276
SEMIVOLATILE COMPOUNDS

| Compound | Concentration (ug/kg) |
|---|---|
| Phenol | 2300. U |
| bis(2-Chlorethyl)Ether | 2300. U |
| 2-Chlorophenol | 2300. U |
| 1,3-Dichlorobenzene | 2300. U |
| 1,4-Dichlorobenzene | 2300. U |
| Benzyl Alcohol | 2300. U |
| 1,2-Dichlorobenzene | 2300. U |
| 2-Methylphenol | 2300. U |
| bis(2-Chloroisopropyl)Ether | 2300. U |
| 4-Methylphenol | 2300. U |
| N-Nitroso-di-n-Propylamine | 2300. U |
| Hexachloroethane | 2300. U |
| Nitrobenzene | 2300. U |
| Isophorone | 2300. U |
| 2-Nitrophenol | 2300. U |
| 2,4-Dimethyphenol | 2300. U |
| Benzoic Acid | 11000. U |
| bis(2-Chloroethoxy)Methane | 2300. U |
| 2,4-Dichlorophenol | 2300. U |
| 1,2,4-Trichlorobenzene | 2300. U |
| Naphthalene | 2300. U |
| 4-Chloroaniline | 2300. U |
| Hexachlorobutadiene | 2300. U |
| 4-Chloro-3-Methyphenol | 2300. U |
| 2-Methylnaphthalene | 2300. U |
| Hexachlorocyclopentadiene | 2300. U |
| 2,4,6-Trichlorophenol | 2300. U |
| 2,4,5-Trichlorophenol | 11000. U |
| 2-Chloronaphthalene | 2300. U |
| 2-Nitroaniline | 11000. U |
| Dimethyl Phthalate | 1100. J |
| Acenaphthylene | 2300. U |
| 3-Nitroaniline | 11000. U |
| Acenaphthene | 2300. U |
| 2,4-Dinitrophenol | 11000. U |
| 4-Nitrophenol | 11000. U |
| Dibenzofuran | 2300. U |
| 2,4-Dinitrotoluene | 2300. U |
| 2,6-Dinitrotoluene | 2300. U |
| Diethylphthalate | 2300. U |
| 4-Chlorophenyl-phenylether | 2300. U |
| Fluorene | 2300. U |
| 4-Nitroaniline | 11000. U |
| 4,6-Dinitro-2-Methylphenol | 11000. U |

Table 3.9 (cont'd)

| Compound | Concentration (ug/kg) |
|---|---|
| N-Nitrosodiphenylamine (1) | 2300. U |
| 4-Bromophenyl-phenylether | 2300. U |
| Hexachlorobenzene | 2300. U |
| Pentachlorophenol | 11000. U |
| Phenanthrene | 2300. U |
| Anthracene | 2300. U |
| Di-n-Butylphthalate | 2300. U |
| Fluoranthene | 2300. U |
| Pyrene | 2300. U |
| Butylbenzylphthalate | 2300. U |
| 3,3'-Dichlorobenzidine | 4500. U |
| Benzo(a)Anthracene | 2300. U |
| bis(2-Ethylhexyl)Phthalate | 2800. B |
| Chrysene | 2300. U |
| Di-n-Octyl Phthalate | 2300. U |
| Benzo(b)Fluoranthene | 2300. U |
| Benzo(k)Fluoranthene | 2300. U |
| Benzo(a)Pyrene | 2300. U |
| Indeno(1,2,3-cd)Pyrene | 2300. U |
| Dibenz(a,h)Anthracene | 2300. U |
| Benzo(g,h,i)Perylene | 2300. U |

B - Compound was detected in QC blank.

J - Reported value is less than the detection limit.

U - Compound analyzed for but not detected. The reported value is the minimum attainable detection limit for the sample.

(1) Cannot be separated from diphenylamine.

Table 3.10

ANALYTICAL RESULTS FOR SAMPLE NO. FF 276
TENTATIVELY IDENTIFIED COMPOUNDS

| Volatile Compound Name | Concentration (ug/kg) |
|---|---|
| Furan, tetrahydro- | 11. JB |
| 2-Propanol (ACN) | 8. J |
| 1-Hexene | 19. J |

| Semivolatile Compound Name | Concentration (ug/kg) |
|---|---|
| Octane, 4-methyl- | 1500. J |
| Heptane, 2,3,6-trimethyl- | 2200. J |
| Butanedioic Acid, Dimethyl ester | 3000. J |
| Pentanedioic Acid, Dimethyl ester | 30000. J |
| Hexanedioic Acid, Dimethyl ester | 39000. J |
| Sulfur, Mol.(S8) | 2600. J |
| Oxirane, 2,2'-[(1-methylethylidene)bis(4,1-phenyleneoxymethylene)]bis- | 21000. J |

B - Compound was detected in QC blank.
J - Estimated value - A 1:1 response factor is assumed.

Table 3.11

ANALYTICAL RESULTS FOR SAMPLE NO. FF 277
VOLATILE COMPOUNDS

| Compound | Concentration (ug/kg) |
|---|---|
| Chloromethane | 12. U |
| Bromomethane | 12. U |
| Vinyl Chloride | 12. U |
| Chloroethane | 12. U |
| Methylene Chloride | 6.1 U |
| Acetone | 12. U |
| Carbon Disulfide | 6.1 U |
| 1,1-Dichloroethene | 6.1 U |
| 1,1-Dichloroethane | 6.1 U |
| Trans-1,2-Dichloroethene | 6.1 U |
| Chloroform | 6.1 U |
| 1,2-Dichloroethane | 6.1 U |
| 2-Butanone | 6.7 BJ |
| 1,1,1-Trichloroethane | 6.1 U |
| Carbon Tetrachloride | 6.1 U |
| Vinyl Acetate | 12. U |
| Bromodichloromethane | 6.1 U |
| 1,2-Dichloropropane | 6.1 U |
| Trans-1,3-Dichloropropene | 6.1 U |
| Trichloroethene | 6.1 U |
| Dibromochloromethane | 6.1 U |
| 1,1,2-Trichloroethane | 6.1 U |
| Benzene | 6.1 U |
| cis-1,3-Dichloropropene | 6.1 U |
| 2-Chloroethylvinylether | 12. U |
| Bromoform | 6.1 U |
| 4-Methyl-2-Pentanone | 12. U |
| 2-Hexanone | 12. U |
| Tetrachloroethene | 6.1 U |
| 1,1,2,2-Tetrachloroethane | 6.1 U |
| Toluene | 6.1 U |
| Chlorobenzene | 6.1 U |
| Ethylbenzene | 6.1 U |
| Styrene | 6.1 U |
| Total Xylenes | 6.1 U |

B - Compound was detected in QC blank.

J - Reported value is less than the detection limit.

U - Compound analyzed for but not detected. The reported value is the minimum attainable detection limit for the sample.

Table 3.12

ANALYTICAL RESULTS FOR SAMPLE NO. FF 277
SEMIVOLATILE COMPOUNDS

| Compound | Concentration (ug/kg) |
|---|---|
| Phenol | 4000. U |
| bis(2-Chlorethyl)Ether | 4000. U |
| 2-Chlorophenol | 4000. U |
| 1,3-Dichlorobenzene | 4000. U |
| 1,4-Dichlorobenzene | 4000. U |
| Benzyl Alcohol | 4000. U |
| 1,2-Dichlorobenzene | 4000. U |
| 2-Methylphenol | 4000. U |
| bis(2-Chloroisopropyl)Ether | 4000. U |
| 4-Methylphenol | 4000. U |
| N-Nitroso-di-n-Propylamine | 4000. U |
| Hexachloroethane | 4000. U |
| Nitrobenzene | 4000. U |
| Isophorone | 4000. U |
| 2-Nitrophenol | 4000. U |
| 2,4-Dimethyphenol | 4000. U |
| Benzoic Acid | 20000. U |
| bis(2-Chloroethoxy)Methane | 4000. U |
| 2,4-Dichlorophenol | 4000. U |
| 1,2,4-Trichlorobenzene | 4000. U |
| Naphthalene | 4000. U |
| 4-Chloroaniline | 4000. U |
| Hexachlorobutadiene | 4000. U |
| 4-Chloro-3-Methyphenol | 4000. U |
| 2-Methylnaphthalene | 4000. U |
| Hexachlorocyclopentadiene | 4000. U |
| 2,4,6-Trichlorophenol | 4000. U |
| 2,4,5-Trichlorophenol | 20000. U |
| 2-Chloronaphthalene | 4000. U |
| 2-Nitroaniline | 20000. U |
| Dimethyl Phthalate | 4000. U |
| Acenaphthylene | 4000. U |
| 3-Nitroaniline | 20000. U |
| Acenaphthene | 4000. U |
| 2,4-Dinitrophenol | 20000. U |
| 4-Nitrophenol | 20000. U |
| Dibenzofuran | 4000. U |
| 2,4-Dinitrotoluene | 4000. U |
| 2,6-Dinitrotoluene | 4000. U |
| Diethylphthalate | 4000. U |
| 4-Chlorophenyl-phenylether | 4000. U |
| Fluorene | 4000. U |
| 4-Nitroaniline | 20000. U |
| 4,6-Dinitro-2-Methylphenol | 20000. U |

Table 3.12 (cont'd)

| Compound | Concentration (ug/kg) |
|---|---|
| N-Nitrosodiphenylamine (1) | 4000. U |
| 4-Bromophenyl-phenylether | 4000. U |
| Hexachlorobenzene | 4000. U |
| Pentachlorophenol | 20000. U |
| Phenanthrene | 4000. U |
| Anthracene | 4000. U |
| Di-n-Butylphthalate | 4000. U |
| Fluoranthene | 4000. U |
| Pyrene | 4000. U |
| Butylbenzylphthalate | 4000. U |
| 3,3'-Dichlorobenzidine | 8000. U |
| Benzo(a)Anthracene | 4000. U |
| bis(2-Ethylhexyl)Phthalate | 1500. BJ |
| Chrysene | 4000. U |
| Di-n-Octyl Phthalate | 4000. U |
| Benzo(b)Fluoranthene | 4000. U |
| Benzo(k)Fluoranthene | 4000. U |
| Benzo(a)Pyrene | 4000. U |
| Indeno(1,2,3-cd)Pyrene | 4000. U |
| Dibenz(a,h)Anthracene | 4000. U |
| Benzo(g,h,i)Perylene | 4000. U |

B - Compound was detected in QC blank.
J - Reported value is less than the detection limit.
U - Compound analyzed for but not detected. The reported value is the minimum attainable detection limit for the sample.

(1) Cannot be separated from diphenylamine.

Table 3.13

ANALYTICAL RESULTS FOR SAMPLE NO. FF 277
TENTATIVELY IDENTIFIED COMPOUNDS

| Volatile Compound Name | Concentration (ug/kg) |
|---|---|
| Furan, tetrahydro- | 7. JB |
| 1-Propen-2-ol, acetate | 8. J |

| Semivolatile Compound Name | Concentration (ug/kg) |
|---|---|
| 2-Hexanone, 5-methyl- | 3200. JB |
| Heptane, 2,3,5-trimethyl- | 2000. JB |

B - Compound was detected in QC blank.
J - Estimated value - A 1:1 response factor is assumed.

Table 3.14

ANALYTICAL RESULTS FOR SAMPLE NO. FF 278
VOLATILE COMPOUNDS

| Compound | Concentration (ug/kg) |
|---|---|
| Chloromethane | 1500. U |
| Bromomethane | 1500. U |
| Vinyl Chloride | 1500. U |
| Chloroethane | 1500. U |
| Methylene Chloride | 750. U |
| Acetone | 3200. |
| Carbon Disulfide | 750. U |
| 1,1-Dichloroethene | 750. U |
| 1,1-Dichloroethane | 750. U |
| Trans-1,2-Dichloroethene | 414. J |
| Chloroform | 750. U |
| 1,2-Dichloroethane | 750. U |
| 2-Butanone | 3400. B |
| 1,1,1-Trichloroethane | 750. U |
| Carbon Tetrachloride | 750. U |
| Vinyl Acetate | 1500. U |
| Bromodichloromethane | 750. U |
| 1,2-Dichloropropane | 750. U |
| Trans-1,3-Dichloropropene | 750. U |
| Trichloroethene | 850. |
| Dibromochloromethane | 750. U |
| 1,1,2-Trichloroethane | 750. U |
| Benzene | 750. U |
| cis-1,3-Dichloropropene | 750. U |
| 2-Chloroethylvinylether | 1500. U |
| Bromoform | 750. U |
| 4-Methyl-2-Pentanone | 1500. U |
| 2-Hexanone | 750. U |
| Tetrachloroethene | 750. U |
| 1,1,2,2-Tetrachloroethane | 750. U |
| Toluene | 820. B |
| Chlorobenzene | 750. U |
| Ethylbenzene | 750. U |
| Styrene | 750. U |
| Total Xylenes | 750. U |

B - Compound was detected in QC blank.

J - Reported value is less than the detection limit.

U - Compound analyzed for but not detected. The reported value is the minimum attainable detection limit for the sample.

Table 3.15

ANALYTICAL RESULTS FOR SAMPLE NO. FF 278
SEMIVOLATILE COMPOUNDS

| Compound | Concentration (ug/kg) |
|---|---|
| Phenol | 24000. U |
| bis(2-Chlorethyl)Ether | 24000. U |
| 2-Chlorophenol | 24000. U |
| 1,3-Dichlorobenzene | 24000. U |
| 1,4-Dichlorobenzene | 24000. U |
| Benzyl Alcohol | 24000. U |
| 1,2-Dichlorobenzene | 24000. U |
| 2-Methylphenol | 24000. U |
| bis(2-Chloroisopropyl)Ether | 24000. U |
| 4-Methylphenol | 24000. U |
| N-Nitroso-di-n-Propylamine | 24000. U |
| Hexachloroethane | 24000. U |
| Nitrobenzene | 24000. U |
| Isophorone | 24000. U |
| 2-Nitrophenol | 24000. U |
| 2,4-Dimethyphenol | 24000. U |
| Benzoic Acid | 120000. U |
| bis(2-Chloroethoxy)Methane | 24000. U |
| 2,4-Dichlorophenol | 24000. U |
| 1,2,4-Trichlorobenzene | 24000. U |
| Naphthalene | 24000. U |
| 4-Chloroaniline | 24000. U |
| Hexachlorobutadiene | 24000. U |
| 4-Chloro-3-Methyphenol | 24000. U |
| 2-Methylnaphthalene | 24000. U |
| Hexachlorocyclopentadiene | 24000. U |
| 2,4,6-Trichlorophenol | 24000. U |
| 2,4,5-Trichlorophenol | 120000. U |
| 2-Chloronaphthalene | 24000. U |
| 2-Nitroaniline | 120000. U |
| Dimethyl Phthalate | 24000. U |
| Acenaphthylene | 24000. U |
| 3-Nitroaniline | 120000. U |
| Acenaphthene | 24000. U |
| 2,4-Dinitrophenol | 120000. U |
| 4-Nitrophenol | 120000. U |
| Dibenzofuran | 24000. U |
| 2,4-Dinitrotoluene | 24000. U |
| 2,6-Dinitrotoluene | 24000. U |
| Diethylphthalate | 24000. U |
| 4-Chlorophenyl-phenylether | 24000. U |
| Fluorene | 24000. U |
| 4-Nitroaniline | 120000. U |
| 4,6-Dinitro-2-Methylphenol | 120000. U |

Table 3.15 (cont'd)

| Compound | Concentration (ug/kg) |
|---|---|
| N-Nitrosodiphenylamine (1) | 24000. U |
| 4-Bromophenyl-phenylether | 24000. U |
| Hexachlorobenzene | 24000. U |
| Pentachlorophenol | 120000. U |
| Phenanthrene | 24000. U |
| Anthracene | 24000. U |
| Di-n-Butylphthalate | 800. J |
| Fluoranthene | 24000. U |
| Pyrene | 24000. U |
| Butylbenzylphthalate | 24000. U |
| 3,3'-Dichlorobenzidine | 48000. U |
| Benzo(a)Anthracene | 24000. U |
| bis(2-Ethylhexyl)Phthalate | 5800. J |
| Chrysene | 24000. U |
| Di-n-Octyl Phthalate | 24000. U |
| Benzo(b)Fluoranthene | 24000. U |
| Benzo(k)Fluoranthene | 24000. U |
| Benzo(a)Pyrene | 24000. U |
| Indeno(1,2,3-cd)Pyrene | 24000. U |
| Dibenz(a,h)Anthracene | 24000. U |
| Benzo(g,h,i)Perylene | 24000. U |

J - Reported value is lesss than the detection limit.

U - Compound analyzed for but not detected. The reported value is the minumum attainable detection limit for the sample.

(1) Cannot be separated from diphenylamine.

Table 3.16

ANALYTICAL RESULTS FOR SAMPLE NO. FF 278
TENTATIVELY IDENTIFIED COMPOUNDS

| Volatile Compound Name | Concentration (ug/kg) |
|---|---|
| Furan, tetrahydro- | 4600. J |
| Methane, isocyano- | 5500. J |
| 1-Pentene, 2-methyl- | 3200. J |
| Pentane, 3-methyl | 15000. JB |
| Tricyclo[3,3,1,13,7]Decane | 7100. J |

| Semivolatile Compound Name | Concentration (ug/kg) |
|---|---|
| 3-Decene, 2,2-dimethyl-,(E)- | 170000. J |
| 2-Decene, 2,4,-dimethyl- | 1100000. J |
| Cyclohexane, 1,5-diethyl-2,3,-dimethyl- | 98000. J |
| 1-Tridecyn-4-ol | 100000. J |
| 3-Hexadecene, (z)- | 150000. J |
| Undecane, 4,7-dimethyl- | 73000. J |
| Nonane, 2-methyl-5-propyl- | 270000. J |
| Hexane, 2,3,3-trimethyl | 130000. J |
| Cyclododecane | 1400000. J |
| Dodecane, 1-iodo- | 880000. J |
| 3-Hexadecene, (z)- | 170000. J |
| Cyclohexadecane | 300000. J |
| Dodecane, 2,7,10-trimethyl- | 93000. J |
| 3-Octadecene, (E)- | 51000. J |

B - Compound was detected in QC blank.
J - Estimated value - A 1:1 response factor is assumed.

Table 3.17

ANALYTICAL RESULTS FOR SAMPLE NO. FF 279
VOLATILE COMPOUNDS

| Compound | Concentration (ug/kg) |
|---|---|
| Chloromethane | 1800. U |
| Bromomethane | 1800. U |
| Vinyl Chloride | 1800. U |
| Chloroethane | 1800. U |
| Methylene Chloride | 910. U |
| Acetone | 6300. |
| Carbon Disulfide | 910. U |
| 1,1-Dichloroethene | 910. U |
| 1,1-Dichloroethane | 910. U |
| Trans-1,2-Dichloroethene | 2500. |
| Chloroform | 910. U |
| 1,2-Dichloroethane | 910. U |
| 2-Butanone | 6500. B |
| 1,1,1-Trichloroethane | 910. U |
| Carbon Tetrachloride | 910. U |
| Vinyl Acetate | 1800. U |
| Bromodichloromethane | 910. U |
| 1,2-Dichloropropane | 910. U |
| Trans-1,3-Dichloropropene | 910. U |
| Trichloroethene | 2800. |
| Dibromochloromethane | 910. U |
| 1,1,2-Trichloroethane | 910. U |
| Benzene | 910. U |
| cis-1,3-Dichloropropene | 910. U |
| 2-Chloroethylvinylether | 1800. U |
| Bromoform | 910. U |
| 4-Methyl-2-Pentanone | 1800. U |
| 2-Hexanone | 1800. U |
| Tetrachloroethene | 910. U |
| 1,1,2,2-Tetrachloroethane | 910. U |
| Toluene | 830. B |
| Chlorobenzene | 910. U |
| Ethylbenzene | 910. U |
| Styrene | 910. U |
| Total Xylenes | 910. U |

B - Compound was detected in QC blank.
U - Compound analyzed for but not detected. The reported value is the minimum attainable detection limit for the sample.

Table 3.18

ANALYTICAL RESULTS FOR SAMPLE NO. FF 279
SEMIVOLATILE COMPOUNDS

| Compound | Concentration (ug/kg) |
|---|---|
| Phenol | 71000. U |
| bis(2-Chlorethyl)Ether | 71000. U |
| 2-Chlorophenol | 71000. U |
| 1,3-Dichlorobenzene | 71000. U |
| 1,4-Dichlorobenzene | 71000. U |
| Benzyl Alcohol | 71000. U |
| 1,2-Dichlorobenzene | 71000. U |
| 2-Methylphenol | 71000. U |
| bis(2-Chloroisopropyl)Ether | 71000. U |
| 4-Methylphenol | 71000. U |
| N-Nitroso-di-n-Propylamine | 71000. U |
| Hexachloroethane | 71000. U |
| Nitrobenzene | 71000. U |
| Isophorone | 71000. U |
| 2-Nitrophenol | 71000. U |
| 2,4-Dimethyphenol | 71000. U |
| Benzoic Acid | 340000. U |
| bis(2-Chloroethoxy)Methane | 71000. U |
| 2,4-Dichlorophenol | 71000. U |
| 1,2,4-Trichlorobenzene | 71000. U |
| Naphthalene | 71000. U |
| 4-Chloroaniline | 71000. U |
| Hexachlorobutadiene | 71000. U |
| 4-Chloro-3-Methyphenol | 71000. U |
| 2-Methylnaphthalene | 71000. U |
| Hexachlorocyclopentadiene | 71000. U |
| 2,4,6-Trichlorophenol | 71000. U |
| 2,4,5-Trichlorophenol | 340000. U |
| 2-Chloronaphthalene | 71000. U |
| 2-Nitroaniline | 340000. U |
| Dimethyl Phthalate | 71000. U |
| Acenaphthylene | 71000. U |
| 3-Nitroaniline | 340000. U |
| Acenaphthene | 17000. U |
| 2,4-Dinitrophenol | 340000. U |
| 4-Nitrophenol | 340000. U |
| Dibenzofuran | 71000. U |
| 2,4-Dinitrotoluene | 71000. U |
| 2,6-Dinitrotoluene | 71000. U |
| Diethylphthalate | 71000. U |
| 4-Chlorophenyl-phenylether | 71000. U |
| Fluorene | 71000. U |
| 4-Nitroaniline | 340000. U |
| 4,6-Dinitro-2-Methylphenol | 340000. U |

Table 3.18 (cont'd)

| Compound | Concentration (ug/kg) |
|---|---|
| N-Nitrosodiphenylamine (1) | 71000. U |
| 4-Bromophenyl-phenylether | 71000. U |
| Hexachlorobenzene | 71000. U |
| Pentachlorophenol | 340000. U |
| Phenanthrene | 71000. U |
| Anthracene | 71000. U |
| Di-n-Butylphthalate | 71000. U |
| Fluoranthene | 71000. U |
| Pyrene | 71000. U |
| Butylbenzylphthalate | 71000. U |
| 3,3'-Dichlorobenzidine | 140000. U |
| Benzo(a)Anthracene | 71000. U |
| bis(2-Ethylhexyl)Phthalate | 5900. J |
| Chrysene | 71000. U |
| Di-n-Octyl Phthalate | 71000. U |
| Benzo(b)Fluoranthene | 71000. U |
| Benzo(k)Fluoranthene | 71000. U |
| Benzo(a)Pyrene | 71000. U |
| Indeno(1,2,3-cd)Pyrene | 71000. U |
| Dibenz(a,h)Anthracene | 71000. U |
| Benzo(g,h,i)Perylene | 71000. U |

J - Reported value is less than the detection limit.

U - Compound analyzed for but not detected. The reported value is the minimum attainable detection limit for the sample.

(1) Cannot be separated from diphenylamine.

Table 3.19

ANALYTICAL RESULTS FOR SAMPLE NO. FF 279
TENTATIVELY IDENTIFIED COMPOUNDS

| Volatile Compound Name | Concentration (ug/kg) |
|---|---|
| Furan, tetrahydro- | 1700. JB |
| Cyclohexane(DOT) | 1700. J |
| Pentane, 3-methyl | 3800. J |
| Tricyclo[3.3.1.13,7]decane | 6700. J |

| Semivolatile Compound Name | Concentration (ug/kg) |
|---|---|
| 3-Decene, 2,2-dimethyl-, (E)- | 820000. J |
| Cyclohexane, 1,5-diethyl-2,3,-dimethyl- | 130000. J |
| 7-Tetradecene,(E)- | 250000. J |
| 7-Hexadecene, (z)- | 270000. J |
| Undecane, 4,7-dimethyl- | 270000. J |
| Decane, 5-propyl- | 370000. J |
| Hexane, 2,3,3-trimethyl- | 200000. J |
| Cyclododecane | 15000000. J |
| Dodecane, 1-iodo- | 3000000. J |
| 3-Hexadecene, (z)- | 1900000. J |
| 5-Eicosene, (E)- | 1200000. J |
| Dodecane, 2,7,10-trimethyl- | 1000000. J |

B - Compound was detected in QC blank.
J - Estimated value - A 1:1 response factor is assumed.

# 4.0 FINAL CONCLUSIONS AND RECOMMENDATIONS

## 4.1 SWMU SPECIFIC CONCLUSIONS AND RECOMMENDATIONS

### SWMU #1 - Twelve Plant A Process Area Sumps

Suggested Action: No further action at this time.

Reasons: These sumps are of concrete construction located within diked process areas. They were in good condition at the time of the VSI. No apparent potential exists for releases of hazardous constituents to soil, groundwater, or surface water.

### SWMU #2 - Six Plant B Process Area Sumps

Suggested Action: No further action at this time.

Reasons: These sumps are of concrete construction located within diked process areas. They were in good condition at the time of the VSI. No apparent potential exists for releases of hazardous constituents to soil, groundwater, or surface water.

### SWMU #3 - West Sump and Ditch

Suggested Action: Soil sampling.

Reasons: The ditch and sump carry stormwater and wastewater from the production of dibasic acid. The ditch is unlined. Liquids were present in the ditch at the time of the VSI. There is a high potential for soil and groundwater release from this unit.

### SWMU #4 - Area 100 South Ditch

Sample Number: FF 278/279

Suggested Action: RCRA Facility Investigation

Reasons: Based on the evidence of the single soil sample taken on the west end of the ditch, chlorinated and nonchlorinated solvents have been released to the soil beneath the Area 100 South Ditch. During discussions with the facility at the time of the VSI, they indicated that no chlorinated solvents had been used at the plant site. However, trichloroethylene and other chlorinated solvents have also been found at high levels in the groundwater to the east of Ponds A and B which were, at one time, part of the facility's wastewater treatment system. The Area 100 South Ditch receives process water from the Area 100 process and stormwater, and no other sources can be identified. The RFI should include a source identification component in order to determine where chlorinated solvents have been used at the facility, and how they have been disposed.

SWMU #5 - Area 300/400 North Ditch

Suggested Action: Soil sampling.

Reasons: The ditch carries stormwater from the 300/400 Area to a sump which leads to the wastewater treatment system. The ditch could handle hazardous constituents present in dilute concentrations in runoff or from spills in the process area. The ditch was wet at the time of the VSI. There is a high potential for the release of hazardous constituents to soil and groundwater.

SWMU #6 - Biotatron

Suggested Action: No further action at this time.

Reasons: This unit now functions as an elementary neutralization unit. It has been closed as a RCRA unit, and no longer is used as a biological treatment system. Although the unit does not have secondary containment, it was in good condition at the time of the VSI.

SWMU #7 - Ponds A and B

Suggested Action: No further action at this time.

Reasons: These two ponds are being closed under an approved RCRA closure plan. They served as holding ponds for wastewater from the Plant A area, which was subsequently pumped to the Biotatron. Wastes have been solidified and removed, and the ponds have been filled in. A single monitoring well east of the ponds has shown high concentrations of organic constituents. Groundwater monitoring is ongoing.

SWMU #8 - Equalization Basin

Suggested Action: Liner condition evaluation.

Reasons: This pond receives wastewater and stormwater from Plant B. It is constructed below grade and equipped with a native clay liner. It is designed to overflow to the impoundment basin. There is a moderate potential for releases from this unit to soil and groundwater, and little potential for releases to surface water. An evaluation of the condition of the liner and penetration of liquid materials would serve to indicate the need for sampling under the ponds.

SWMU #9 - Impoundment Basin

Suggested Action: Liner condition evaluation.

Reasons: This pond receives wastewater and stormwater from the equalization basin. It is constructed below grade and equipped with a native clay liner. It is designed to pump wastewater to the aeration basins. There is a low potential for releases from this unit to soil and groundwater, and little potential for releases to surface water. An evaluation of the condition of the liner and penetration of liquid materials would serve to indicate the need for sampling under the ponds.

SWMU #10- North and South Aeration Basins

Suggested Action: No further action at this time.

Reasons: These units were RCRA regulated until the Biotatron was constructed in 1983. They received wastes with very low or high pH. The ponds were constructed with double liner and leachate systems. They have been operated at times with inadequate freeboard, but the potential for surface water release is very low.

SWMU #11- Tank T-1218

Suggested Action: No further action at this time.

Reasons: This tank was used for waste storage in the Plant A area. It is a closed, fixed roof tank located on a concrete pad. There is no apparent potential for releases from this tank as it contains manually controlled pumps and is located within a bermed area of the plant.

SWMU #12 - Tank T-1117

Suggested Action: No further action at this time.

Reasons: This tank was used for waste storage in the Plant A area. It is a closed, fixed roof tank located on a concrete pad. There is no apparent potential for releases from this tank as it contains manually controlled pumps and is located within a bermed area of the plant.

SWMU #13 - Tank T-105

Suggested Action: No further action at this time.

Reasons: This tank was used for waste storage in the Plant A area. It is a closed, fixed roof tank located on a concrete pad. There is no apparent potential for releases from this tank as it contains manually controlled pumps, is connected to Tank T-107, and is located within a bermed area of the plant.

SWMU #14 - Tank T-107

Suggested Action: No further action at this time.

Reasons: This tank was used for waste storage in the Plant A area. It is a closed, fixed roof tank located on a concrete pad. There is no apparent potential for releases from this tank as it contains manually controlled pumps, is connected to Tank T-105, and is located within a bermed area of the plant.

SWMU #15 - Tank T-305

Suggested Action: No further action at this time.

Reasons: This tank was used for waste storage in the Plant A area. It is a closed, fixed roof tank located on a concrete pad. There is no apparent potential for releases from this tank as it contains manually controlled pumps and is located within a bermed area of the plant.

SWMU #16 - Tank T-335

Sample Number: FF 277

Suggested Action: No further action under corrective action authorities at this time.

Reasons: Sampling did not reveal the presence of any volatile or base/neutral acid extractable organic compounds in the soil around this tank.

SWMU #17 - Drum Wash Area

Suggested Action: No further action at this time.

Reasons: The drum wash area is an inactive area where drums were once triple-rinsed prior to reuse or off-site disposal. The area is constructed of concrete and is curbed. It contains a sump in the middle to receive drainage which subsequently is treated in the plant's wastewater treatment system. There is no apparent potential for releases to soil, groundwater or surface water.

SWMU #18 - Temporary Drum Storage Area

Suggested Action: No further action at this time.

Reasons: This drum storage area, located next to the drum wash area, is on concrete. There is no apparent potential for releases to soil, groundwater, or surface water.

SWMU #19 - Spray Dryer and Baghouse

Suggested Action: No further action at this time.

Reasons: This inactive unit was used for drying of unspecified products prior to packaging and shipping. It is equipped with a baghouse for the control of dusts. The unit was in good condition with no evidence of release visible during the VSI.

SWMU #20 - Two Plant A Sandboxes

Suggested Action: No further action at this time.

Reasons: The sandboxes in Plant A are used to prevent drippage and minor leaks from product transfer from pipelines to trucks from reaching the ground. The sand in the boxes is removed as needed, drummed and stored in the container storage building prior to off-site removal. The units were in good condition during the VSI.

SWMU #21 - Plant B Truck Transfer Area

Sample Number: FF 276

Suggested Action: No further action under corrective action authorities at this time.

Reasons: Sampling did not reveal the presence of any volatile or base/neutral acid extractable organic compounds in the soil in the vicinity of the SWMU.

SWMU #22 - Container Storage Building

Suggested Action: No further action at this time.

Reasons: The container storage building is located in Plant A. A portion of it is used for the storage of hazardous wastes in drums for less than 90 days. The building and stored waste materials were in excellent condition at the time of the VSI. There is no apparent potential for the release of hazardous constituents from this unit.

SWMU #23 - Boneyard

Suggested Action: No further action at this time.

Reasons: The boneyard, located in Plant B, is used for the storage of scrap metal and other inert materials. No wastes containing hazardous constituents are present in this area.

## 4.2 RESULTS OF QC-RELATED ANALYSES

QC analyses consisted of surrogate recovery, matrix spike and matrix spike duplicate recovery, methods blanks, and GC/MS tuning and mass calibration. An equipment blank (FF 274) was also collected in the field. Analytical results for sample FF 274 were presented in Tables 3.2, 3.3, and 3.4. Methylene chloride was the only compound detected in the equipment blank at 1400 ug/L.

Three methods blanks were analyzed in the lab: MB1, MB2, and MB3. MB1 represented a low concentration level soil sample; MB2 represented a low concentration level water sample and MB3 represented a medium concentration soil sample. Table 4.1 summarizes the results of these analyses. All concentrations of compounds found in these methods blanks were below the contract

Table 4.1

METHODS BLANKS ANALYSES

| Sample | Compound | Concentration | CRDL* |
| --- | --- | --- | --- |
| MB1 | Acetone | 7.6 ug/kg J | 10 ug/kg |
| | 2-Butanone | 7.4 ug/kg J | 10 ug/kg |
| | Furan, tetrahydro | 9.0 ug/kg J | --- |
| | Di-n-Butyl Phthalate | 8.0 ug/kg J | 330 ug/kg |
| | Bis(2-ethylhexyl) Phthalate | 11.0 ug/kg J | 330 ug/kg |
| | 2-Hexone, 5-methyl | 2300.0 ug/kg J | --- |
| | Hexane, 2,3,4-trimethyl | 1100.0 ug/kg J | --- |
| | Heptane, 2,3,5-trimethyl | 1700.0 ug/kg J | --- |
| | 2-Propanone, 1-cyclohexyl | 150.0 ug/kg J | --- |
| MB2 | Furan, tetrahydro | 12.0 ug/L J | --- |
| | Propanoic acid, 2-methyl-, 3-hydroxyl | 7.0 ug/L J | --- |
| MB3 | 2-Butanone | 9.0 ug/kg J | 10 ug/kg |
| | Toluene | 4.0 ug/kg J | 5 ug/kg |
| | Pentane, 3-methyl | 23.0 ug/kg J | --- |

* Contract Required Detection Limit.
J Reported value is less than detection limit.
--- Detection limit not established.

required detection limit (CRDL). Methylene chloride, acetone, and toluene are solvents commonly used in the lab. The presence of these compounds in the equipment blank or methods blanks is most likely due to unavoidable laboratory contamination. Phthalate esters are also commonly found in methods blanks as a result of laboratory contamination.

One low level soil sample (FF 275) and one medium level soil sample (FF 279) were subjected to soil matrix spike (MS) and soil matrix spike duplicate (MSD) recovery analyses. For the low level sample, the MS/MSD recovery for phenol, 2-chlorophenol, and 4-chloro-3-methylphenol were above the maximum QC limits. N-nitroso-di-n-propylamine MSD recovery was below the minimum QC limit in the low level sample. The MS/MSD recovery for all other VOA and BNA compounds in the low level sample were within specified QC limits. In addition, for the low level sample, two compounds, n-nitroso-di-n-propylamine and n-nitrophenol, were outside specified QC limits for the relative percent differences (RPD) between the MS and MSD samples. All other compounds were within QC limits for RPD in the low level sample.

For the medium level sample, the MS and MSD recovery for 1,2,4-trichlorobenzene, 2,4-dinitrotoluene, n-nitroso-di-n-propylamine, and 1,4-dichlorobenzene were outside QC limits. In addition, the MSD recovery for pyrene and 4-chloro-3-methylphenol were below QC limits. The MS/MSD recovery for all other semivolatile compounds in the medium level sample were within specified QC limits. Six compounds, acenaphthene, 2,4-dinitrotoluene, pyrene, n-nitroso-di-n-propylamine, phenol, and 4-chloro-3-methylphenol were ouside specified QC limits for RPD in the medium level sample. All other semivolatile compounds were within QC limits for RPD. No VOA compound QC analyses were performed on the medium level sample due to operator error. Pentachlorophenol was diluted out of the medium level sample.

Surrogate compounds were added to each of the five soil samples (FF 275, FF 276, FF 277, FF 278, and FF 279), the equipment blank (FF 274), three methods blanks (MB1, MB2, and MB3), two soil matrix spike samples (FF 275 MS and FF 279 MS), and two duplicate soil matrix spike samples (FF 275 MSD and 279 MSD) to determine percent recovery information. Surrogate recovery for 2-fluorobiphenyl in three soil samples analyzed at low levels (FF 276, FF 275 MS, and

275 MSD) was outside QC limits (above 115% recovery), possibly due to matrix interferences. Reanalysis of these samples was not required. BNA surrogates in sample FF 277 were diluted out. Surrogate recovery of all other samples analyzed at low and medium levels were within QC limits.

Instrument calibration and tuning met all contract requirements.

# Appendix A

## FIELD SAMPLING PHOTOGRAPHS

DIXIE CHEMICAL SAMPLING VISIT
PHOTO LOG
7/16/87

1. Soap Solution for decontamination of dedicated sampling equipment prior to sampling.

2. Decontamination of sampling equipment.

3. Collection of background soil sample (Sample #FF276) southwest of Plant B office building.

4. Collection of soil sample at SWMU No. 21, the ditch at the truck transfer Area (Sample #FF276).

5. Collection of soil sample at SWMU No. 21, the ditch at the truck transfer Area (Sample #FF276).

6. Collection of soil sample at SWMU No. 16, Tank T-335 (Sample #FF277).

**Reference 3**

II-B-1

# RCRA FACILITY ASSESSMENT
# PR/VSI REPORT

[redacted]
PASADENA, TEXAS
EPA [redacted]

Prepared for:

U.S. Environmental Protection Agency
Region VI
1445 Ross Avenue
Dallas, Texas 75202

Prepared by:

A.T. Kearney, Inc.
3 Lagoon Drive, Suite 170
Redwood City, California 94065

and

Science Applications International Corporation
13400-B Northup Way, Suite 38
Bellevue, Washington 98005

EPA Contract No. 68-01-7374
Work Assignment No. R26-01-36
SAIC Project No. 2-817-08-042-00



August 1987

TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

TABLE OF CONTENTS (continued)

TABLE OF CONTENTS (continued)

## 1.0 INTRODUCTION

This section of the PR/VSI report covers the purpose and scope of the RFA program. The contents of the other sections of this report are also described.

### 1.1 Purpose and Scope of the RFA Program

The 1984 Hazardous and Solid Waste Amendments (HSWA) provide new authority to EPA to require comprehensive corrective actions on solid waste management units (SWMUs) and other areas of concern at interim status hazardous waste management facilities, particularly those applying for RCRA permits. These corrective actions are intended to address unregulated releases of hazardous constituents to air, subsurface water, soil, and groundwater, as well as the generation of subsurface gas.

One of the major segments of EPA's corrective action program consists of RCRA Facility Assessments (RFAs) to identify releases or potential releases requiring further investigation. According to EPA's RCRA Facility Assessment Guidance Document, the four purposes of an RFA are to:

1. Identify and gather information on releases at RCRA-regulated facilities;
2. Evaluate solid waste management units and other areas of concern for releases to all media and regulated units for releases other than groundwater;
3. Make preliminary determinations regarding releases of concern and the need for further actions and interim measures at the facility; and
4. Screen from further investigation those SWMUs which do not pose a threat to human health and the environment.

The three basic steps of an RFA consist of a preliminary review (PR) of file information, a visual site inspection (VSI) to obtain additional information on releases and, if necessary, a sampling visit to fill data gaps by obtaining field and analytical data.

### 1.2 Contents of this Report

This report presents the results of the PR and VSI of the Dixie Chemical Company near Pasadena, Texas. The principal sources of information used in conducting the PR included the facility's RCRA Part B permit application, files of EPA Region VI and the Texas Department of Water Resources, the Texas Water Commission, and various contractor reports prepared for Dixie.

The VSI was conducted by the A.T. Kearney team on July 14, 1987. The Dixie Chemical Company representative present was John Perrin, Environmental Specialist. The A.T. Kearney team representatives were Patricia O'Flaherty and Barry Langer.

Section 2.0 of this report contains a description of the Dixie Chemical facility, including its historical and current operations. Individual SWMUs also are identified in Section 2.0 along with a summary description of the wastes managed by the facility. Section 3.0 provides an overview of the environmental setting at the facility, comprising meteorology and air quality, floodplain and surface water, geology and soils, groundwater, and receptor information. In Section 4.0, a broad assessment of release pathways is made, covering the potential for releases to soil, groundwater, surface water, and air. Section 5.0 contains detailed discussions of each SWMU, while Section 6.0 covers other areas of concern (i.e., releases from production areas, spills, and evidence of contamination of unknown origin). Section 7.0 provides conclusions and recommendations, while Section 8.0 includes a list of references. The VSI photograph log and field log are included as Appendices A and B to the report.

## 2.0 FACILITY DESCRIPTION

This section of the PR/VSI report identifies the location of the facility and presents a description of historical and current operations. It also presents brief descriptions of the SWMUs that were identified and the wastes managed at the facility.

### 2.1 Location

The Dixie Chemical Company is located in an industrial area at 10701 Bay Area Boulevard approximately two miles south of the city of Pasadena, in Harris County, Texas (Figure 1). The facility covers approximately 22 acres and is bisected by a stormwater discharge canal and the discharge canal for the Gulf Coast Waste Management Authority Industrial Wastewater Treatment Plant (IWTP). The IWTP is located to the south of the plant site.(3,16)

### 2.2 Facility Operations

The Dixie Chemical Company Bayport facility is a service chemical company, engaged in the manufacturing, formulating, and packaging of chemicals on a demand basis for a wide variety of customers. In the mid-1970s the major products manufactured at the facility included glycols and ketones.(17) As of 1986, about 75 percent of the plant's operations consisted of manufacture and formulation of organic chemicals including epoxy compounds, glycidol, and various glycols. Other organic and inorganic chemical accounted for an additional 15 percent of the business, while the remaining 10 percent involved the formulation and wholesaling of drill muds and other oil field chemicals.(3) About 80 percent of the products formulated or packaged leave the facility under labels other than Dixie Chemical.(17) According to facility representatives, chemicals being formulated or manufactured change on a frequent basis, depending on market demand.

Glycols are straight chain aliphatic hydrocarbons containing two hydroxyl groups. They are, as a class, considered to be of low toxicity and have low vapor pressures under normal temperatures.(22) Ketones are hydrocarbons which may be classed as aliphatic, aromatic, or heterocyclic depending on the nature of the hydrocarbon group attached to the carbonyl group. They are relatively volatile, as a class and are excellent solvents.(22)

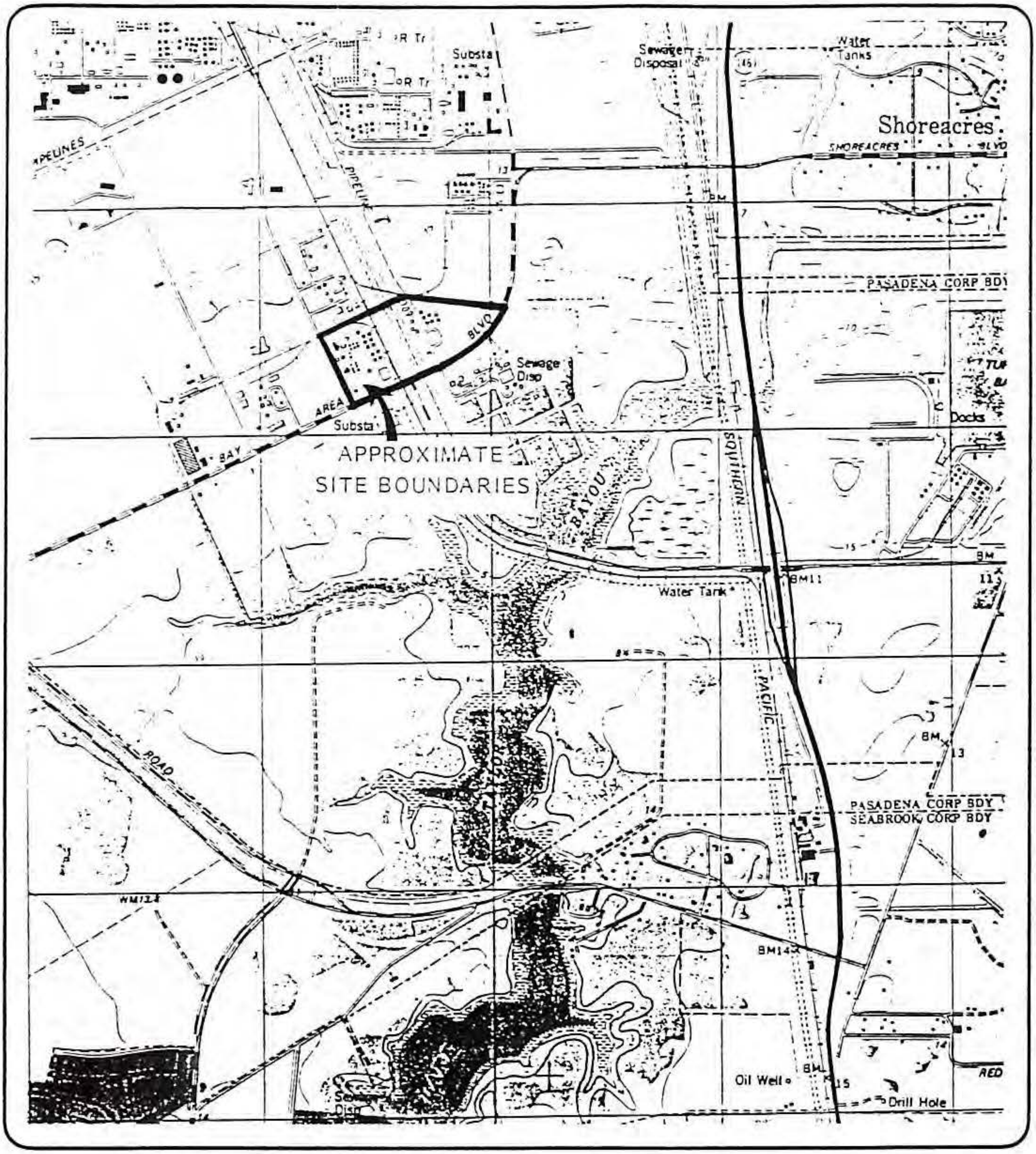



Figure 1

LOCATION MAP OF DIXIE CHEMICAL COMPANY
PASADENA, TEXAS FACILITY
Source: USGS Topo. Map, League City Quadrangle, 1982.

The manufacturing facility is divided into two segments: Plant A and Plant B. Plant A, on the west side of the storm drainage canal, occupies about 13 acres and includes seven separate manufacturing areas known by their numbers: 100, 300, 400, 600, 1100, 1200, and 1400. Products made in the 100 Area include glycidols, anhydrides, methoxyethoxy surfactants, and chloroglyciniol. In the 300/400 Area, acetonitrile and butanediol (butylene glycol) are made. Chlorine is made in the 600 Area. The 1100/1200 area is used for custom blending of epinols. The 1400 Area is currently inactive, but at one time was the site of drill muds manufacture and coatings for vitamins. Other products formulated in unspecified areas of the plant include dibasic acids, methanol, catalysts, and hydrazine. Many of the products made by at the site are ignitable and reactive, and are strong oxidizers.(5,17,18)

Plant B is devoted to the formulation of stearified dibasic acid. No other production processes occur in this area. Plant B consists of a manufacturing area and tank storage. Also located in the Plant B area is most of the wastewater treatment system for the entire facility.(17)

## 2.3 Identification of Solid Waste Management Units

Each of the production processes generates waste byproducts and wastewater from cooling, rinsewater, and process water. Based on information in the files reviewed and gathered during the Visual Site Inspection, 42 Solid Waste Management Units (SWMUs) were identified at Dixie Chemical. The SWMUs and their regulatory status are shown in Table 1 and Figures 2 and 3.

Dry waste chemicals and waste sludges are pumped to one of six tanks on the property: T-105 (SWMU #13), T-107 (SWMU #14), T-305 (SWMU #15), T-1117 (SWMU #12), T-1218 (SWMU #11) in Plant A, and T-335 (SWMU #16) in Plant B. The bulk of the wastes generated at the facility are generated in Plant B and stored in Tank T-335; this is the only one of the six tanks which is used continuously for waste storage. The other five tanks are used interchangeably for waste and product storage.(5,17,18)

Wastewater and stormwater is transferred to sumps located in each of the process areas (SWMUs #1 and 2). In Plant A, wastewaters enter the Elementary Neutralization Facility (ENF) (SWMU #6) where elementary neutralization takes

TABLE 1

SOLID WASTE MANAGEMENT UNITS AT THE DIXIE CHEMICAL FACILITY IN PASADENA, TEXAS

| SMWU NO. | SWMU NAME | RCRA REGULATED? |
|---|---|---|
| 1 | Twelve Plant A Process Area Sumps | No |
| 2 | Six plant B Process Area Sumps | No |
| 3 | West Sump and Ditch | No |
| 4 | Area 100 South Ditch | No |
| 5 | Area 300/400 North Ditch | No |
| 6 | Elementary Neutralization Unit (a.k.a. Biotatron) | No longer regulated |
| 7 | Ponds A and B | Yes |
| 8 | Equalization Basin | No |
| 9 | Impoundment Basin | No |
| 10 | North and South Aeration Basins | No |
| 11 | Tank T-1218 | Yes |
| 12 | Tank T-1117 | Yes |
| 13 | Tank T-105 | Yes |
| 14 | Tank T-107 | Yes |
| 15 | Tank T-305 | Yes |
| 16 | Tank T-335 | Yes |
| 17 | Drum Wash Area | No |
| 18 | Temporary Drum Storage Area | No |
| 19 | Spray Dryer and Baghouse | No |
| 20 | Two Plant A Sandboxes | No |
| 21 | Plant B Truck Transfer Area | No |
| 22 | Container Storage Building | No longer regulated |
| 23 | Boneyard | No |

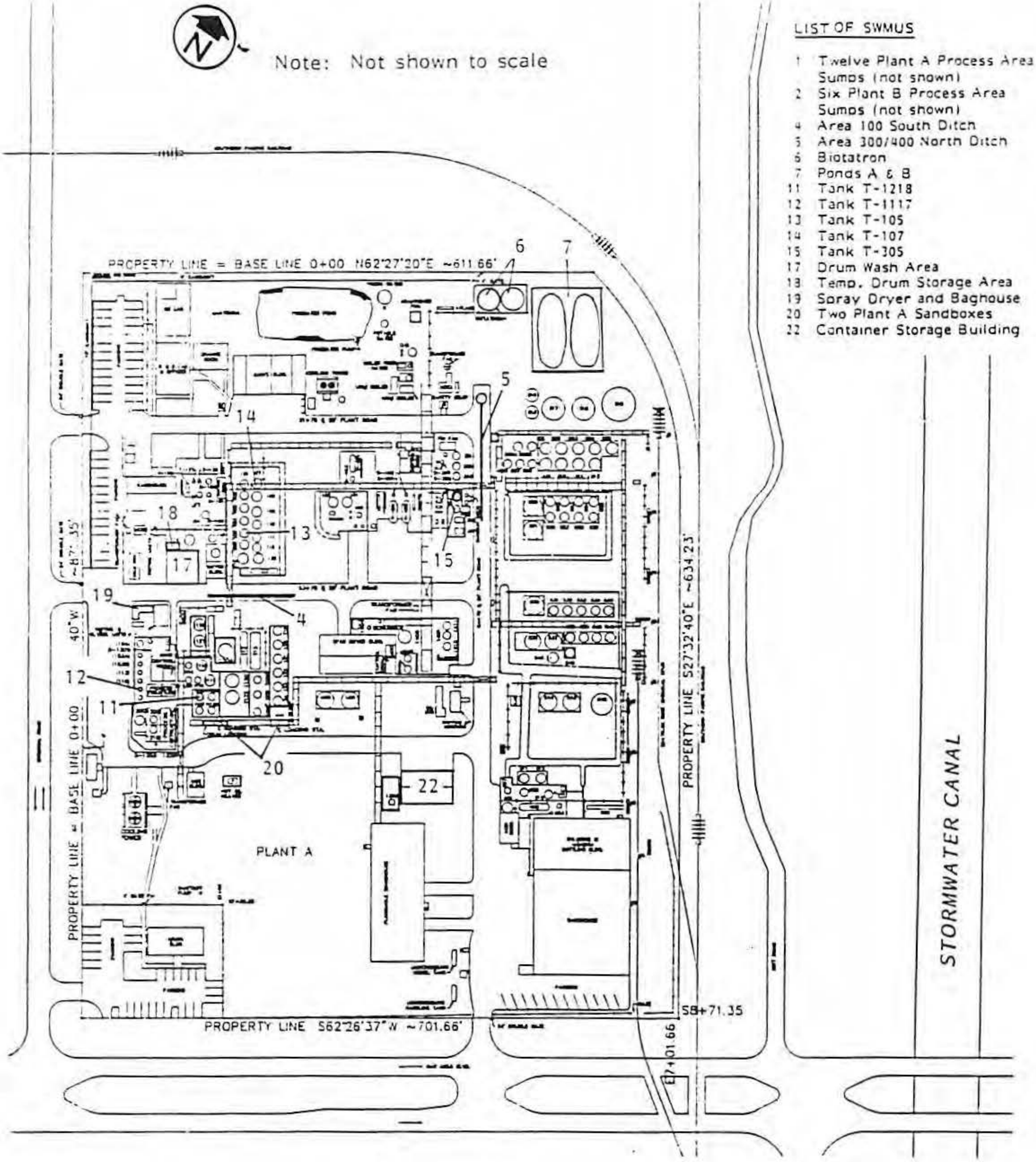



Figure 2

LOCATION OF SOLID WASTE MANAGEMENT UNITS IN PLANT A
AT DIXIE CHEMICAL COMPANY
Source: Visual Site Inspection, 7/14/87.

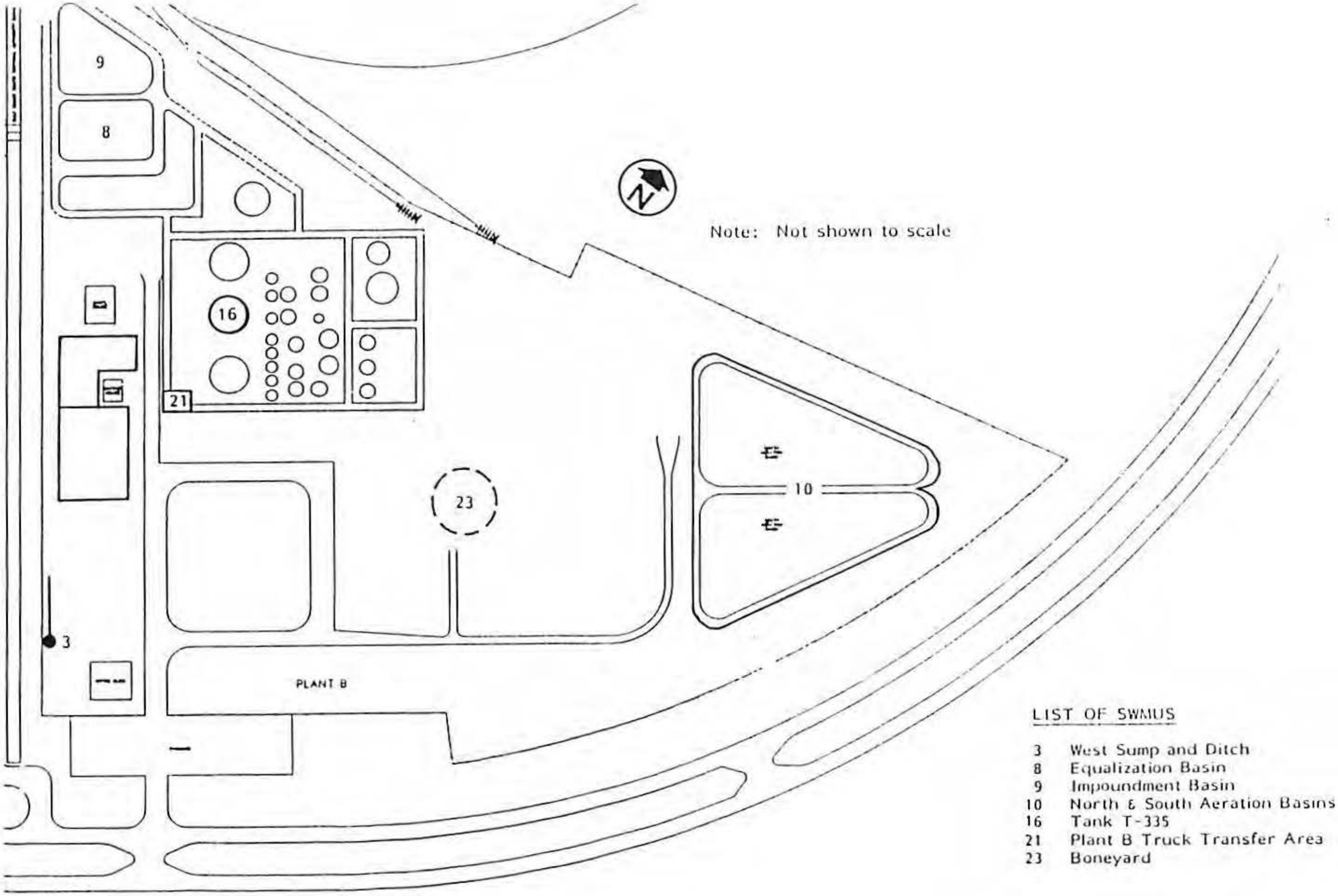



Figure 3

LOCATION OF SOLID WASTE MANAGEMENT UNITS IN PLANT B AT DIXIE CHEMICAL COMPANY
Source: Visual Site Inspection, 7/14/87.

place. From here, the neutralized water is pumped to the North and South Aeration Basins (SWMU #10). Here, floating aerators serve to enhance microbial degradation of the waste material prior to its discharge under permit to the Gulf Coast Waste Management Authority IWTP. Stormwater runoff from each of the process areas is collected in unlined ditches which flow to sumps (SWMUs #4 and 5); the water is then pumped to the ENF (SWMU #6), thus entering the wastewater treatment system.(17)

Wastewater and stormwater in Plant B is collected in sumps (SWMU #2) and pumped to the Equalization Basin (SWMU #8), then to the Impoundment Basin (SWMU #9); no treatment takes place in either of these units. From the Impoundment Basin, wastewaters are pumped to the North and South Aeration Basins (SWMU #10). Stormwater runoff from the Plant B process area enters the West Sump and Ditch (SWMU #3), from which it is pumped to the Equalization Basin (SWMU #8).(5,17)

Prior to 1983, the facility maintained a somewhat different wastewater treatment system. Wastewater from Plant A was sent to Ponds A and B (SWMU #7) located west of the Biotatron. Here it was held prior to treatment in the Biotatron, which at that time consisted of a single 50,000 gallon tank containing a package biological treatment system for extended aeration. Flow rates and retention times for this tank were not available for this review. Wastewater from the Biotatron was then pumped to the aeration basins. This system was changed because highly acidic or caustic wastewaters were entering the Aeration Basins on an intermittent basis, causing them to contain wastes which were considered to be RCRA regulated due to pH values outside the range of 2 to 12 S.U. Ponds A and B were closed, wastes were removed, and the ponds were filled in. Sludges in the Biotatron were placed in the ponds and the biotatron was decontaminated. Subsequently, a second tank was constructed at the Biotatron and the two tanks now function as an elementary neutralization unit, and thus are not RCRA regulated.(5,17)

There are a number of other areas at the facility where wastes are managed. Drum washing used to occur in a concrete curbed area in Plant A (SWMU #17); this activity ceased in the early 1980s and is not expected to reoccur. A Temporary Drum Storage Area (SWMU #18) was observed during the VSI to the north of this unit. Plant A also has a Container Storage Building (SWMU #22), a portion of which is used for hazardous waste storage for less than 90 days. The rest of the building is used for product storage.(5,17) No drum storage is reported to occur in Plant B.(17)

There are truck loading/unloading areas in each of the plants. In Plant A, these loading areas are underlain by boxes filled with sand (SWMU #19) to catch drips and minor spillage of viscous material. The material generally solidifies on contact with air. The sand is periodically shovelled up, put in drums, and stored in the container storage building (SWMU #22) prior to off-site removal. In Plant B, the transfer area is used for the transfer of wastes from Tank T-335 (SWMU #16) as well as the transfer of products. It is underlain by a concrete pad but contains no curbing or other secondary containment.(17)

An inactive Spray Dryer and Associated Baghouse (SWMU #19) are located in Plant A. The spray dryer was used to dry drilling chemicals prior to packaging and shipping.(17)

An area known as the Boneyard (SWMU #23) is located in the south central portion of Plant B. This area is used for the storage of scrap metal and salvageable materials. No hazardous wastes or materials are stored in this location.(17)

## 3.0 ENVIRONMENTAL SETTING

This section of the PR/VSI report describes meteorology, floodplain and surface water characteristics, geology and soil characteristics, groundwater quality, and receptor information.

### 3.1 Meteorology

The Dixie Chemical facility is located in an area of humid, subtropical climate characterized by long, hot summers and mild winters. Humidity is generally high in the area following a diurnal cycle of high humidity in the early morning hours, followed by a drop in the middle of the day and a gradual rise in the evening hours. The average temperature is 77.7°F. The prevailing wind direction is south-southeasterly. Annual precipitation averages 52 inches per year.(20)

### 3.2 Floodplain and Surface Water

The facility is bisected by the water discharge canal which carries wastes to the Gulf Coast Waste Disposal Authority Industrial Wastewater Treatment Plant (IWTP) and a stormwater canal.(10) The facility is located approximately 1500 feet northwest of Taylor Bayou, a brackish body of water which is connected with Galveston Bay.(10,19)

Surface elevations of the facility range from 10 to 12 ft MSL. Floodplain elevations occur at 11.0 to 11.8 ft MSL.(18) No portions of the facility are known to occur in the 100 year floodplain, due to extensive diking around the stormwater canal. During hurricanes in the early 1980s, the facility was not flooded by overflow from the stormwater canal.(18)

### 3.3 Soils and Geology

Harris County lies within the coastal plain of Texas. The geologic formations dip gently to the south and east to the Gulf of Mexico. The Dixie Chemical facility lies on the Pleistocene deposits of the Beaumont formation. This unit consists of 80 or more feet of clays, underlain by massive strata of interbedded sands and clays. The extent of the Beaumont formation beneath the facility is unknown. Regionally, the formation is as much as 500 ft thick.(20)

Two major aquifers occur in this area. The Chicot Aquifer is the upper regional unit, consisting of sands and silty sands. The base of the Chicot Aquifer in the vicinity of Dixie Chemical is at approximately -600 ft MSL. Beneath the Chicot Aquifer is the Evangeline Aquifer, another sand unit. The base of the Evangeline Aquifer in the vicinity of the facility is approximately -3800 ft MSL.(22) In south Harris County, drinking water comes primarily from the Chicot Aquifer as the Evangeline Aquifer is subject to saline intrusion. (22)

In the Plant A area, a clay layer has been found to extend from the surface to 13-20 feet below ground surface. This is underlain by a "partially confined aquifer" of sands and silts; this unit is 8 to 20 ft thick. Underlying the sand/silt layer is a red clay of unknown thickness. Similar conditions are found in the monitoring wells drilled in the Plant B area.(7,21)

3.4 Groundwater

Eight monitoring wells have been drilled in both Plants A and B at the facility. MW-1, 2, and 3 are located in Plant A and MW-4 through MW-8 are located in Plant B. Groundwater has been encountered at 13 to 28 ft in a silty sand unit which is 6 to 20 ft thick, depending on its location at the facility.(10) Both of Chicot and Evangeline Aquifers have been subject to heavy pumping, which has radically altered groundwater flow and recharge regimes within the region.(19) Prior to the time of extensive pumping, the regional flow in the deeper aquifers was south-southeast; it is now north-northwest.(10) Evaluations conducted by the Texas Water Commission have indicated that the groundwater flow regime in the shallow water table aquifer is complicated by proximity of the discharge canal, and Taylor Bayou as well as the pumping mentioned above.

Groundwater is found at 5 to 13 feet below ground surface at the Dixie facility.(10,21) Groundwater flow under the facility is subject to flow direction reversals.(10) Mounding of groundwater was reported under Ponds A and B in 1986.(10) In Plant B, shallow groundwater flow is generally west-northwest. (10) Mounding of groundwater has been reported in the monitoring wells near the Aeration Basins (SWMU #10).(10)

Four quarters of groundwater monitoring data were available for this assessment. Groundwater in MW-3 located east of Ponds A and B (SWMU #7) has been found to contain 12,000 to 16,000 ug/L epichlorohydrin, 58,000 to 93,000 ug/L trans-1,2 dichloroethylene, and 22,000 to 72,000 ug/L trichloroethylene.(16) Lower concentrations of other organics have also been measured in this well. Other wells do not appear to be contaminated.

### 3.5 Receptor Information

Dixie Chemical Company is located in an industrial area southeast of the city of Pasadena. Southeast of the facility is a privately operated industrial wastewater treatment plant owned by the Gulf Coast Waste Management Authority. Taylor Bayou lies approximately 1500 feet southeast of the facility. According to the facility, there are no wells within a mile of Dixie Chemical that are used for drinking water.(5,18)

## 4.0 RELEASE PATHWAYS

This section provides an overview of the potential for the release of hazardous constituents to the various environmental media. This potential is based on the combination of waste characteristics, facility characteristics, and environmental setting.

### 4.1 Air Pathway

The wastes stored at the facility in the impoundments are dilute and not highly volatile. Minor air releases may occur from the Aeration Basins (SWMU #10) as a result of the aeration activities. Other minor releases are expected to occur from the sumps and open ditches in the process areas (SWMUs #1, 2, 3, 4, and 5).

### 4.2 Surface Water Pathway

Most of the plant process areas are diked with earthen or oystershell berms, enclosing most of the waste management units. A potential for surface water release appears to exist only from the West Sump and Ditch (SWMU #3). All other areas would drain via ditches and sumps, and eventually be run through the facility's wastewater treatment system.

### 4.3 Soil Pathway

There is a high potential for soil releases from the unlined ditches and unlined impoundments throughout the property. Of major concern are the ditches, which carry both stormwater runoff and process water flow (SWMU #4). Groundwater in the vicinity of Ponds A and B (SWMU #10) is contaminated, indicating a past release to soil. Soil contamination may also be present in the vicinity of the Equalization Basin (SWMU #8) and the Impoundment Basin (SWMU #9), as these impoundments are lined only with native clay. The potential for releases to soil from tanks and drum storage do not appear to be significant. However, the tanks are located on concrete pads but are surrounded by soil, thus the potential for soil release does exist from leaks or spills.

### 4.4 Groundwater Pathway

Groundwater monitoring is occurring at the site in eight monitoring wells located in Plant Areas A and B. High concentrations of organic contaminants have been measured in a single well located east of Ponds A and B (SWMU #7). (16) There is a moderate potential for the release of hazardous constituents to groundwater from the other impoundments and from the unlined ditches.

## 5.0 DESCRIPTIONS OF INDIVIDUAL UNITS

### 5.1 SWMU # 1 - TWELVE PLANT A PROCESS AREA SUMPS

#### 5.1.1 Information Summary

Unit Description: In each of the seven process areas within Plant A are sumps which serve to carry storm runoff and process wastewater to the treatment system. The sumps are below grade, constructed of concrete, and are approximately three feet in diameter.(17) The depth of the sumps are unknown. Two of the twelve sumps were observed during the VSI.

Dates of Operation: The date of startup of these units is presumed to be the dates when each of the process areas came on-line. They are all active units.(17)

Wastes Managed: The sumps contain a mixture of storm runoff and process wastewater including boiler blowdown containing various metals, dilute dibasic acids, and other unspecified wastewaters.(17)

Release Controls: The sumps are located within curbed, concrete-lined process areas. They each contain level activated pumps for overflow control. Water is pumped to the wastewater treatment system.(17)

History of Releases: There is no documented release history for these units. No evidence of release was observed during the VSI.(17)

#### 5.1.2 Release Potential

- Soil/Groundwater: The potential for release of hazardous constituents to soil from these sumps is dependent on the integrity of the sump. Based on the condition of the sumps observed during the VSI, the potential for release from these units is low.

- Surface Water: There is no potential for the release of hazardous constituents from the sumps to surface water as they are fully contained within concrete curbed areas and are equipped with level activated pumps.

- Air: Based on the non-volatile nature of the wastes placed in these units, there is no known potential for the release of hazardous constituents to air.

- Subsurface Gas: Based on the waste types entering the sumps, there is no potential for the generation of subsurface gas.

## 5.2 SWMU #2 - SIX PLANT B PROCESS AREA SUMPS

### 5.2.1 Information Summary

Unit Description: In each of the process areas within Plant B are sumps which serve to carry storm runoff and process wastewater to the treatment system. The sumps are below grade, constructed of concrete, and are approximately three feet in diameter.(17) The depth of the sumps are unknown. One of the six sumps was observed during the VSI.

Dates of Operation: The date of startup of these units is presumed to be the dates when Plant B came on-line. They are all active units.(17)

Wastes Managed: The sumps contain a mixture of storm runoff and process wastewater including boiler blowdown containing various metals, dilute dibasic acids, and other unspecified wastewaters.(17)

Release Controls: The sumps are located within curbed, concrete-lined process areas. They each contain level activated pumps for overflow control. Water is pumped to the wastewater treatment system.(17)

History of Releases: There is no documented release history for these units. No evidence of release was observed during the VSI.(17)

### 5.2.2 Release Potential

- Soil/Groundwater: The potential for release of hazardous constituents to soil from these sumps is dependent on the integrity of the sump. Based on the condition of the sumps observed during the VSI, the potential for release from these units is low.

- Surface Water: There is no potential for the release of hazardous constituents from the sumps to surface water as they are fully contained within concrete curbed areas and are equipped with level activated pumps.

- Air: Based on the non-volatile nature of the wastes placed in these units, there is no known potential for the release of hazardous constituents to air.

- Subsurface Gas: Based on the waste types entering the sumps, there is no potential for the generation of subsurface gas.

## 5.3 SWMU #3 - WEST SUMP AND DITCH

### 5.3.1 Information Summary

Unit Description: The West Sump and Ditch receives stormwater and process wastewater from Plant B. The ditch is an unlined below grade ditch approximately three feet wide and at least two feet deep. It extends along the western side of the Plant B area, and is terminated at the south end by the West Sump. The sump is approximately three feet in diameter and of unspecified depth. Water entering the sump is pumped directly to the Equalization Basin (SWMU #8). At the time of the VSI, standing water was present in the sump and ditch.(17) The unit is directly next to the discharge canal which carries other plant wastewaters to the Industrial Wastewater Treatment Plant.

Dates of Operation: This sump and ditch have been active since the startup of Plant B in late 1974. This is an active unit.(17)

Wastes Managed: The sump and ditch receive wastewaters from the production of dibasic acids. These wastewaters are acidic, but are not expected to contain other hazardous constituents.(17) The sump also receives storm runoff from the Plant B portion of the property, containing unspecified constituents.

Release Controls: The ditch is unlined. The sump is constructed of concrete. (17) The sump is equipped with a level-activated pump.

History of Releases: There is no documented history of releases from this unit. The lack of an impermeable lining of the ditch infers that wastewater has percolated as well as being conveyed along the ditch.

### 5.3.2 Release Potential

- Soil/Groundwater: There is a high potential for past and ongoing release to soil and groundwater from this unit, based on the presence of the unlined ditch. There is only a very low potential for release from the sump itself.

- Surface Water: This unit is directly next to the discharge canal which carries other plant wastewaters to the industrial waste treatment plant.

Overflows of the ditch during heavy rains could reach this discharge canal via overflow to an off-site storm ditch. There is no other apparent potential for surface water releases.

- Air: The wastes carried in this unit are not volatile. Therefore, there is a no potential for the release of hazardous constituents to air.

- Subsurface Gas: Based on the inorganic nature of the wastes, there is no potential for the generation of subsurface gas.

### 5.4 SWMU #4 - AREA 100 SOUTH DITCH

#### 5.4.1 Information Summary

Unit Description: On the south side of Area 100 is an unlined ditch which carries some process wastes as well as storm runoff from the 100 Area and from the adjacent tank farm in Plant A. The ditch is approximately three feet wide and several hundred feet long. It is about one foot deep.(17) The process area in which the ditch is located is surrounded by 3 foot high earthen and concrete berms. Wastewaters in this ditch flow to a sump which discharges to the wastewater treatment system.

Dates of Operation: The ditch has been present since the late 1960's. It is an active unit.(17)

Wastes Managed: The ditch carries process wastewater from the 100 Area in addition to stormwater. Wastewaters may contain glycidol, anhydrides, various surfactants, as well as other complex hydrocarbons.(17)

Release Controls: There are no release controls for this unit other than that it is contained within the facility's stormwater control area. Overflows would thus be directed to a sump and pumped to the plant's wastewater treatment system.

History of Releases: There is no documented history of release for this unit. Although there was no standing liquid observed in the ditch during the VSI, sludges and mud were present, indicating a recent release to soil.(17)

#### 5.4.2 Release Potential

- Soil/Groundwater: Releases to soil occur from this unit on an ongoing basis. There is a high potential for release to groundwater due to the constant hydraulic gradient serving to drive hazardous constituents downward.

- Surface Water: There is no known potential for release of hazardous constituents to surface water from this unit, as it is located within Plant A's stormwater control area.

- Air: Wastes carried in this ditch have very low vapor pressures; thus the potential for release of hazardous wastes or constituents to air is low.

- Subsurface Gas: The presence of organic waste constituents in wastewater continually seeping into the soil could lead to anaerobic conditions, thus posing a low to moderate potential for the generation of subsurface gas.

## 5.5 SWMU #5 - AREA 300/400 NORTH DITCH

### 5.5.1 Information Summary

Unit Description: On the north side of Area 300/400 is an unlined ditch which carries storm runoff from the 300/400 Area in Plant A. The ditch is approximately three feet wide and several hundred feet long. It is about one foot deep.(17) The process area in which the ditch is located is surrounded by 3 foot high earthen and concrete berms. Wastewaters in this ditch flow to a sump which discharges to the wastewater treatment system.(17)

Dates of Operation: The ditch has been present since the late 1960's. It is an active unit.(17)

Wastes Managed: The ditch carries stormwater from the 300/400 Area. Hazardous wastes or constituents may include butanediol and acetonitrile, as well as other complex hydrocarbons.(17)

Release Controls: There are no release controls for this unit.

History of Releases: There is no documented history of release for this unit. Standing liquid was observed in the ditch during the VSI, indicating an ongoing release to soil.(17)

### 5.5.2 Release Potential

- Soil/Groundwater: Releases to soil of constituents in low concentrations occur from this unit on an ongoing basis. There is a high potential for release to groundwater due to the constant hydraulic gradient serving to drive hazardous constituents downward.

- Surface Water: There is no known potential for release of hazardous constituents to surface water from this unit, as it is located within a diked process area of Plant A.

- Air: This unit carries only stormwater; therefore, constituents present are thought to be in low concentration and thus would present only a low potential for release of hazardous constituents to air.

- Subsurface Gas: The presence of low concentrations of organic waste constituents in stormwater continually seeping into the soil could lead to anaerobic conditions, thus posing a low potential for the generation of subsurface gas.

## 5.6 SWMU #6 - ELEMENTARY NEUTRALIZATION FACILITY (a.k.a., Biotatron)

### 5.6.1 Information Summary

Unit Description: The Elementary Neutralization Facility (ENF) consists of two 50,000 gallon tanks located at the northern edge of the property west of former Ponds A and B (SWMU #7). The tanks are constructed of carbon steel and are open-topped.(5) The platform beneath each of the tanks is concrete, but the tanks are not located within a bermed area of the facility.(17) The tanks currently receive wastewater from the Plant A process units. The current system was designed to prevent highly acidic or caustic wastewater from reaching any of the impoundments, thus rendering wastes in the impoundments RCRA exempt. Wastewater is neutralized in the tanks by mixing acid and caustic wastestreams or by addition of lime, and it is then pumped to the Aeration Basins (SWMU #10).(19) The units each have level-controlled pumps to control overtopping.

The west tank was at one time used as a package biological treatment unit known as the Biotatron; the facility was unable to supply information concerning flow rates or retention times for this unit when it was used for biological treatment.(17)

Dates of Operation: The west tank of this unit was constructed sometime in the early 1970s; the east tank was constructed after 1984.(5,17) These are both active units.(17) The west tank underwent closure as a hazardous waste tank in 1987, under TWC regulation.(14) Wastes were removed and pumped to the wastewater treatment system. Remaining sludge was transferred from the tank to Ponds A and B.(14)

Wastes Managed: Currently the ENF functions as an elementary neutralization facility for acidic and caustic wastes. These neutralized wastewaters subsequently flow to the Aeration Basins (SWMU #10). Prior to 1984, the unit received process wastewater from Plant A and discharged it to Ponds A and B, and was used as a holding tank for Plant A liquids. Sample analyses of sludges in the west tank in 1984 prior to closure indicated chromium at 0.47 mg/kg, pH of 10 S.U., and specific conductivity of 18,500 umhos/cm.(12) Other hazardous constituents present in this tank have not been identified by the facility.

Release Controls: The tanks are located on concrete platforms at the north edge of the property. They are both equipped with level activated pumps which cause wastewater to enter the aeration basins.(17) The unit is located with the facility's stormwater control area; overflows would eventually reach sumps which would convey the liquid back to the wastewater treatment system.

History of Releases: There is no documented history of releases from this unit; no evidence of release was observed during the VSI.

5.6.2 Release Potential

- Soil/Groundwater: Because the tanks are not located within a bermed or curbed area, there is a moderate potential for soil and groundwater release if the units overflow or leak. However, this potential is minimized by the presence of level operated pumps.

- Surface Water: Based on the location of the tanks within the stormwater control area, there is no potential for release of hazardous constituents to surface water.

- Air: Although the units are open-topped, the acid and caustic wastes managed have very low vapor pressures; thus, there is only a low potential for release of hazardous constituents to air during the neutralization process.

- Subsurface Gas: Based on the aboveground construction of the unit, there is no potential for the generation of subsurface gas.

5.7.2 Release Potential

- Soil/Groundwater: Groundwater releases from these units are RCRA regulated. There was a high potential for soil releases from these ponds while they were active. There is no remaining potential for soil release as wastes have been removed from these units, and the ponds closed and covered.

- Surface Water: There may have been a low potential for release of hazardous constituents to surface water when the ponds were active. Because the units are now closed and covered, there is no remaining potential for the release of hazardous constituents to surface water.

- Air: There may have been a low potential for release of hazardous constituents to air when the ponds were active. Because the units are now closed and covered, there is no remaining potential for the release of hazardous constituents to air.

- Subsurface Gas: There may have been a low potential for generation of subsurface gas when the ponds were active. Although the units are now closed and covered, there are organic compounds present in nearby groundwater monitoring wells. Thus, there is a low ongoing potential for subsurface gas generation.

## 5.8 SWMU #8 - EQUALIZATION BASIN

### 5.8.1 Information Summary

Unit Description: This RCRA regulated unit is trapezoidal in shape, with sides being approximately 115 ft x 65 ft. Its operating depth is approximately 8 ft with a capacity of 200,000 gallons.(5) The unit receives wastewater from Plant B Process Area Sumps (SWMU #2), and is designed to equalize flow to the Impoundment Basin (SWMU #9).(17) The unit is designed to overflow to the Impoundment Basin.(17)

Dates of Operation: This is an active unit; its date of startup is not known.

Wastes Managed: The wastes entering this unit include vessel residues from dibasic acid production and boiler blowdown, as well as runoff from the tank farm and process areas.(5,17) These wastes are inorganic and are RCRA hazardous due to reactivity and corrosivity.

Release Controls: The unit is lined with native clay. The condition of the clay liners could not be evaluated during the VSI. Wastewaters are allowed to overflow to the Impoundment basin.(17)

History of Releases: There is no documented release history from this unit; no evidence of release was observed during the VSI.

### 5.8.2 Release Potential

- Soil/Groundwater: There is a low to moderate potential for the release of hazardous constituents to the soils and groundwater beneath this unit, depending on the condition of the native clay liners.

- Surface Water: There is no known potential for the release of hazardous constituents to surface water since the unit is designed to overflow to the Equalization Basin.

- Air: Wastes managed in this unit are inorganic and no aeration occurs during wastewater retention. Therefore, there is no potential for the release of hazardous wastes or constituents to air.

- <u>Subsurface Gas:</u> There is no known potential for the generation of subsurface gas due to the inorganic nature of the waste materials.

## 5.9 SWMU #9 - IMPOUNDMENT BASIN

### 5.9.1 Information Summary

Unit Description: This triangular shaped impoundment has dimensions of 115 ft x 115 ft x 150 ft, with an operating depth of approximately 8 ft.(5) The impoundment is lined on the bottom and sides with native clay. It can hold approximately 220,000 gallons of wastewater. The impoundment is entirely below grade; the portion of the unit above water line is vegetated. The impoundment receives wastes from the tank farm in the Plant B area and from the Equalization Basin (SWMU # 8).(5,17) From here it is pumped to the Aeration Basins (SWMU #10).(17)

Dates of Operation: This is an active unit; its date of startup is not known.

Wastes Managed: The wastes entering this unit include vessel residues from dibasic acid production and boiler blowdown, as well as runoff from the tank farm and process areas.(5,17) The wastes are inorganic and are RCRA hazardous due to reactivity and corrosivity.

Release Controls: The impoundment is lined with native clay. The condition of the liner could not be evaluated during the VSI. The pond is equipped with manually operated pumps to pump wastewater to the Aeration Basins. The unit is contained within the facility's stormwater control area. Overflows from the unit would eventually reach sumps which would pump the water back to the wastewater treatment system.

History of Releases: There is no documented history of releases from this impoundment. No evidence of release was observed during the VSI.

### 5.9.2 Release Potential

- Soil/Groundwater: There is a low to moderate potential for the release of hazardous constituents to the soils and groundwater beneath this unit, depending on the condition of the native clay liners.

- Surface Water: There is no known potential for the release of hazardous constituents to surface water, because any overflow will enter the stormwater control area and re-enter the wastewater treatment system.

- Air: Wastes managed in this unit are inorganic and no aeration occurs during wastewater retention. Therefore, there is no potential for the release of hazardous wastes or constituents to air.

- Subsurface Gas: There is no known potential for the generation of subsurface gas due to the inorganic nature of the wastewater.

## 5.10 SWMU #10 - NORTH AND SOUTH AERATION BASINS

### 5.10.1 Information Summary

Unit Description: The North and South Aeration Basins are triangular shaped basins located in the eastern portion of the Plant B. They are each 125 ft x 225 ft x 250 ft, with an operating depth of approximately 12 ft.(5) They each have an operating capacity of approximately 1.3 million gallons.(5) The ponds have berms approximately 3 ft above grade. The impoundments are lined, have a 2 foot thick clay liner, leachate collection system, a 1.5 ft clay liner, and crushed limestone.(5) It is unknown whether they were first constructed with the liners in place. The ponds contain floating aeration units.(4) Wastewater flows from the ENF (SWMU #6) to the North Aeration Basin, then overflows to the South Aeration Basin, and is subsequently discharged to the Gulf Coast Waste Disposal Authority Industrial Wastewater Treatment Plant via the discharge canal.(17)

Dates of Operation: The age of these units is not known. They are currently active.(17)

Wastes Managed: These units receive neutralized wastewater from the ENF. As such, these wastes would include neutralized dibasic acids, diethylene and triethylene glycols, dibasic esters, butanediol, acetonitrile, and methanol.(4) In 1984, sludges from this unit were analyzed and characterized as Class II wastes under the Texas regulations.(8) Sludges from one of the basins (unknown which one) contained 2500 mg/kg ethylene glycol.(4)

Release Controls: The ponds are double-lined with clay, and have an intermediate leachate collection system.(5) The facility repaired the liner in the South Aeration Basin in 1984 for unspecified reasons.(8)

History of Releases: In a 1984 inspection, the North Aeration Basin was reported to show evidence of overtopping. Organic stains and odors were present along the north side of the basin.(8) Facility representatives indicated that this overtopping was only foam from the impoundment.(8) No evidence of release was observed during the VSI.

5.10.2 Release Potential

- Soil/Groundwater: Groundwater releases from these units are RCRA regulated. Based on the presence of liners and leachate collection system, there is a low potential for the release of hazardous constituents to soil.

- Surface Water: If the impoundments overflowed, there is a low potential that wastewater may enter the discharge canal to the Industrial Wastewater Treatment Plant. No other releases to surface water are expected.

- Air: Because the units are aerated and handle organic constituents, there is a high potential for the release of hazardous constituents to air.

- Subsurface Gas: There is a low potential for the generation of subsurface gas depending on the condition of liners and leachate collection systems for these units.

## 5.11 SWMU #11 - TANK T-1218

### 5.11.1 Information Summary

Unit Description: This RCRA regulated unit is a 2,000 gallon carbon steel holding tank which has been used for the storage of wastes from the 1100/1200 area of Plant A.(5) The tank is 6.5 ft in diameter and 8 ft high.(18) It is currently being used for the storage of products.(17) The tank is in a paved curbed area, with sumps which drain to the wastewater treatment system.(17)

Dates of Operation: The date of startup of this tank is unknown. It was removed from service as a waste tank in 1981.(18)

Wastes Managed: This unit is used for the storage of wet waste epoxy, industrial process wastewater containing unspecified hydrocarbons, and tolyltrazole reactor residues.(2) Wastes in this unit are ignitable.(18)

Release Controls: The tank is in a paved curbed area, with sumps which drain to the wastewater treatment system.(17) It is of closed, fixed roof design, and is equipped with manual waste feed cutoff valves.(18)

History of Releases: There is no documented history of release from this unit. No evidence of release was observed during the VSI.

### 5.11.2 Release Potential

- Soil/Groundwater: Based on the construction and location of the tank, there is no potential for the release of hazardous constituents.

- Surface Water: Based on the construction and location of the tank, there is no potential for the release of hazardous constituents.

- Air: Based on the organic, ignitable wastes managed, there is a low potential for the release of hazardous constituents during maintenance and cleaning.

- Subsurface Gas: Based on the aboveground construction and location of the tank, there is no potential for the release of hazardous constituents.

## 5.12 SWMU #12 - TANK T-1117

### 5.12.1 Information Summary

Unit Description: This RCRA regulated unit is a 2,000 gallon carbon steel holding tank which has been used for the storage of wastes from the 1100/1200 area of Plant A.(5) The tank is 6.5 ft in diameter and 8 ft high.(18) It is currently being used for the storage of product.(17) The tank is in a paved curbed area, with sumps which drain to the wastewater treatment system.(17)

Dates of Operation: The tank came into use as a waste storage tank in 1981, replacing tank T-1218.(18) The tank is an active unit.(17)

Wastes Managed: This unit is used for the storage of wet waste epoxy, industrial process wastewater containing hydrocarbons, and tolyltrazole reactor residues.(2) Wastes in this unit are ignitable.(18)

Release Controls: The tank is in a paved curbed area, with sumps which drain to the wastewater treatment system.(17) It is of closed, fixed roof design, and is equipped with manual waste feed cutoff valves.(18)

History of Releases: There is no documented history of release from this unit. No evidence of release was observed during the VSI.

### 5.12.2 Release Potential

- Soil/Groundwater: Based on the construction and location of the tank, there is no potential for the release of hazardous constituents.

- Surface Water: Based on the construction and location of the tank, there is no potential for the release of hazardous constituents.

- Air: Based on the organic, ignitable wastes managed, there is a low potential for the release of hazardous constituents during maintenance and cleaning.

- Subsurface Gas: Based on the above ground construction and location of the tank, there is no potential for the release of hazardous constituents.

## 5.13 SWMU #13 - TANK T-105

### 5.13.1 Information Summary

Unit Description: This 8,000 gallon carbon steel tank is located in the 100 Area.(5) It is on a concrete foundation is a curbed plant process area, with sumps that drain to the wastewater treatment system.(17) The tank is 12 ft in diameter and 14.5 ft high. Wastes may be piped to Tank 107 or directly to tanker trucks for off-site disposal.(18) The tank is only intermittently used for the storage of wastes. Otherwise, it is used as a product storage tank.(17)

Dates of Operation: This is an active unit.(17)

Wastes Managed: This unit receives alkaline wastewater, industrial process wastewater containing unspecified hydrocarbons, reactor vessel washwater, caustic wastes, sodium chloride brine, organic acids, and tolyltriazole reactor residues.(2) Wastes in this tank are ignitable.(18)

Release Controls: The closed, fixed roof tank is located on a concrete foundation in a diked area, with sumps which drain to the wastewater treatment system.(17) The tank is equipped with manual waste feed cutoff valves.(18)

History of Releases: There is no documented history of releases from this unit. No evidence of release was seen during the VSI.(17)

### 5.13.2 Release Potential

- Soil/Groundwater: Based on the location and construction of this unit, there is no potential for the release of hazardous constituents.

- Surface Water: Based on the location and construction of this unit, there is no potential for the release of hazardous constituents.

- Air: Based on the organic, ignitable wastes managed, there is a low potential for the release of hazardous constituents during maintenance and cleaning.

- Subsurface Gas: Based on the aboveground location and construction of this unit, there is no potential for the release of hazardous constituents.

## 5.14 SWMU #14 - TANK T-107

### 5.14.1 Information Summary

Unit Description: This 11,500 gallon carbon steel tank is located in the 100 Area of Plant A.(5) It is constructed on a concrete foundation and located in a curbed area with sumps which drain to the wastewater treatment system.(5,17) The tank is 12 ft in diamter and 15 ft high. Wastes may be pumped directly to the tank from process areas or from tank T-105.(18) This tank is only intermittently used for the storage of wastes; it is otherwise used for product storage.

Dates of Operation: The startup date of this unit is unknown. This is an active unit.(17)

Wastes Managed: This unit receives wastes from various production processes in Plant A. These wastes include alkaline wastewater, industrial process wastewater containing unspecified hydrocarbons, reactor vessel washwater, caustic wastes, sodium chloride brine, organic acids, and tolyltriazole reactor residues.(2) Wastes in this tank are ignitable.(18)

Release Controls: The tank is on a concrete foundation in a curbed area, with sumps which drain to the wastewater treatment system. It is of closed, fixed roof design, and is equipped with manual waste feed cutoff valves.(18)

History of Releases: There is no documented history of release from this unit. No evidence of release was seen during the VSI.

### 5.14.2 Release Potential

- Soil/Groundwater: Based on the location and construction of this unit, there is no potential for the release of hazardous constituents.

- Surface Water: Based on the location and construction of this unit, there is no potential for the release of hazardous constituents.

- Air: Based on the organic, ignitable wastes managed, there is a low potential for the release of hazardous constituents during maintenance and cleaning.

- Subsurface Gas: Based on the aboveground location and construction of this unit, there is no potential for the release of hazardous constituents.

## 5.15 SWMU #15 - TANK T-305

### 5.15.1 Information Summary

Unit Description: This 10,000 gallon carbon steel tank is located in the 300 area of Plant A. It is constructed on a concrete foundation and located in a curbed area with sumps which drain to the wastewater treatment system.(5,17) The tank is 10 ft in diameter and 19 ft high. Wastes are pumped to the tank and periodically removed by tanker truck.(18) This tank is only intermittently used for the storage of wastes; it is otherwise used for product storage.

Dates of Operation: The date of startup is unknown. This is an active unit. (17)

Wastes Managed: This unit receives wastes from various production processes in Plant A. These wastes include alkaline wastewater, industrial process wastewater containing unspecified hydrocarbons, reactor vessel washwater, caustic wastes, and sodium chloride brine.(2) Wastes in this unit are ignitable.(18)

Release Controls: The tank is constructed on a concrete foundation and located in a curbed area with sumps which drain to the wastewater treatment system. (5,17) It is of closed, fixed roof design, and is equipped with manual waste feed cutoff valves.(18)

History of Releases: There is no documented history of release from this unit. No evidence of release was seen during the VSI.

### 5.15.2 Release Potential

- Soil/Groundwater: Based on the location and construction of this unit, there is no potential for the release of hazardous constituents.
- Surface Water: Based on the location and construction of this unit, there is no potential for the release of hazardous constituents.
- Air: Based on the organic, ignitable wastes managed, there is a low potential for the release of hazardous constituents during maintenance and cleaning.

* Subsurface Gas: Based on the aboveground location and construction of this unit, there is no potential for the release of hazardous constituents.

## 5.16 SWMU #16 - TANK T-335

### 5.16.1 Information Summary

Unit Description: Tank T-335 is located within Plant B, in a tank farm with a number of feedstock and product tanks. It is used for the storage of hazardous waste generated from the Plant B production processes. This tank is the only tank on the facility which is dedicated to the storage of waste materials. (17) The tank is constructed of stainless steel, and has a 10,000 gallon capacity.(5) The tank is 11.2 ft in diameter and 16.2 ft high.(18) It is located on a concrete foundation within an unpaved area. The entire tank farm is surrounded by earthen or oystershell berms approximately four feet high. (5,17)

Dates of Operation: This unit is presumed to have come into use when operations first commenced at Plant B in 1974. This is an active unit.(17)

Wastes Managed: Wastes managed in this unit include industrial process wastewater containing unspecified hydrocarbons, unspecified organic chemicals, and waste organic acids.(5,17) Reactor vessel residues in this tank have been found to contain 42 ppm chromium.(18)

Release Controls: The tank is a closed, fixed roof unit. It is set on a concrete pad, but is not individually bermed or diked.(17) Soil surrounds the concrete foundation. The tank is equipped with manual feed cutoff valves.(18)

History of Releases: There is no documented release history for this unit. There was minor evidence of staining on the tank at the time of the VSI.(17)

### 5.16.2 Release Potential

- Soil/Groundwater: If the tank overflows, or spillage occurs during transfer of contents, there is a low potential for the release of hazardous constituents to soil and possibly groundwater. This is due to the presence of soil around the concrete foundation.

- Surface Water: Because the entire tank farm is surrounded by a berm, there is no potential for the release of hazardous constituents from this tank to surface water.

- Air: There is a low potential for the release of hazardous constituents to air from this unit, because the tank is vented, and may contain volatile constituents.

- Subsurface Gas: There is no potential for subsurface gas generation because this unit is aboveground on a concrete platform.

## 5.17 SWMU #17 - DRUM WASH AREA

### 5.17.1 Information Summary

Unit Description: The drum wash area is located centrally in Plant A. This inactive unit is constructed of concrete and surrounded by a six inch concrete curb with a central sump which is pumped to tank T-107.(17) This area was used for the triple rinsing of drums prior to off-site disposal or recycling. (6)

Dates of Operation: The drum wash area was constructed in the early 1970s. The facility ceased washing drums in 1983.(17)

Wastes Managed: Drums which contained unspecified acids, caustics, and some organic chemicals were washed in this unit.(6)

Release Controls: The unit is constructed of concrete, surrounded by curbing, and is equipped with a sump to divert wastes to tank T-107 or the wastewater treatment system.(6,17)

History of Releases: A 1984 TDWR inspection report indicates that the sump in this wash area showed "signs of corrosion".(8) The entire unit appeared to be in good condition at the time of the VSI.

### 5.17.2 Release Potential

- Soil/Groundwater: There is a moderate potential for past releases from this unit, if the sump in the wash area had cracks or leaks. There is no ongoing potential for release, as the unit is inactive.

- Surface Water: Based on the location and construction of this unit, there is no potential for surface water releases.

- Air: The potential for past releases to air cannot be evaluated without additional information regarding the wastes managed in this unit. There is no ongoing release potential, as this unit is inactive.

- Subsurface Gas: There is a low potential for past gas generation from this unit from organic chemical constituents, if the sump in the wash area had cracks or leaks. There is no ongoing potential for release, as the unit is inactive.

## 5.18 SWMU #18 - TEMPORARY DRUM STORAGE AREA

### 5.18.1 Information Summary

Unit Description: Located west of the Drum Wash Area (SWMU #17), is a 20 ft x 30 ft area which was being used for the temporary storage of drums at the time of the VSI. Approximately 21 drums were located here, waiting off-site reconditioning.(17) The area in which the drums were located was underlain by concrete.(17)

Dates of Operation: This is an active unit; it is unknown how long drums may have been stored in this area.(17)

Wastes Managed: According to the facility, the drums contained unspecified solidified waste materials. Several of the drums were empty.(17)

Release Controls: This area is underlain by concrete pavement which was in good condition at the time of the VSI. No other release controls were observed.(17)

History of Releases: There is no documented history of release from this unit.(17)

### 5.18.2 Release Potential

- Soil/Groundwater: Because the unit is underlain by concrete in good condition, there is a very low potential for the release of hazardous constituents to soil or groundwater. In addition, all wastes have been solidified.

- Surface Water: Based on the location of this unit within Plant A, there is no potential for the release of hazardous constituents to surface water.

- Air: Based on the good condition of the drums during the VSI and the solidified nature of the contents of the drums, there is no potential for the release of hazardous constituents to air.

- Subsurface Gas: There is no potential for the generation of subsurface gas, as this is an aboveground unit which is located on concrete.

## 5.19 SWMU #19 - SPRAY DRYER AND BAGHOUSE

### 5.19.1 Information Summary

Unit Description: The Spray Dryer and Associated Baghouse was used for the drying of unspecified materials produced at Plant A. The unit is a Cyclone dryer; it is located on concrete within a bermed area. The process capacity of this unit could not be identified during the VSI. The unit is now used in drill mud production and no longer produces a dusty waste. When the unit was actively used for drying, dusts produced were collected in an associated baghouse and placed into hoppers. The wastes were periodically removed and taken to a Class II landfill.(17)

Dates of Operation: The unit was built in 1970 or 1971; it became inactive in the early 1980s.(17)

Wastes Managed: The wastes managed in the baghouse are not known, as the materials were not specified by the facility during the VSI.(17)

Release Controls: The unit is fully enclosed, and is located on a concrete pad within a bermed area of Plant A.(17)

History of Releases: There is no documented history of releases from this unit. No evidence of release was observed during the VSI.(17)

### 5.19.2 Release Potential

- Soil/Groundwater: Based on the fully enclosed and contained nature of the unit, there is no past potential for releases to soil or groundwater. Because the unit is no longer used for waste storage, there is no remaining potential for releases.

- Surface Water: Based on the fully enclosed and contained nature of the unit, there is no past potential for releases to surface water. Because the unit is no longer used for waste storage, there is no remaining potential for releases.

- Air: There was a high potential for air releases from this unit during its normal operation. There is no remaining potential as the unit is no longer used for the same purpose.

- Subsurface Gas: Based on the fully enclosed and contained nature of the unit, there is no past potential for generation of subsurface gas. Because the unit is no longer used for waste storage, there is no remaining potential for releases.

## 5.20 SWMU #20 - TWO PLANT A SANDBOXES

### 5.20.1 Information Summary

Unit Description: Two sandboxes are located at the Plant A loading/unloading areas where products are removed from storage and readied for transportation. These two areas consist of a concrete base, curbed area filled with sand which surrounds the valve pits for truck transfer areas. The curbed areas are approximately 5 ft x 10 ft with 6 inch high curbs.(17) The boxes are designed to retain leaks from minor spills occurring when hose connections are changed at the pipes. When the sand becomes saturated, it is shovelled into drums which are taken to the Container Storage Building (SWMU #22). New sand is then brought in.

Dates of Operation: The initial dates of use of this unit are unknown. The sanboxes are actively used.(17)

Wastes Managed: The sandboxes may receive material from any of the products made in the Plant A area. These products all contain complex hydrocarbons, and may be highly acidic, caustic, or ignitable.(17) However, these wastes are very viscous and solidify with exposure to air.

Release Controls: The areas are underlain by concrete and surrounded by 6-inch high curbs.(17)

History of Releases: There is no documented history of release. No evidence of release was seen during the VSI.

### 5.20.2 Release Potential

- Soil/Groundwater: There is a low potential for the release of hazardous constituents because the unit is located on a concrete slab, is curbed, and is within a diked plant area.

- Surface Water: There is a low potential for the release of hazardous constituents because the unit is located on a concrete slab, is curbed, and is within a diked plant area. In addition, the collected hazardous wastes are in a solidified state.

- Air: There is a low potential for air release from any volatile constituents in the products spilled. The material is very viscous and binds the sand; therefore, there is no known potential for particulate release.

- Subsurface Gas: There is no known potential for subsurface gas generation from this unit because of the aboveground nature of the unit.

## 5.21 SWMU #21 - PLANT B TRUCK TRANSFER AREA

### 5.21.1 Information Summary

Unit Description: The truck transfer area is located in the southwest corner of Plant B and is the area where both wastes and products are transferred from storage tanks to tanker trucks. The transfer pad, which is approximately 5 ft x 5 ft, is constructed of concrete. It is without curbing or other secondary containment. Any liquids on the pad drain to an unlined ditch, which eventually reaches the West Sump and Ditch (SWMU #3).(17)

Dates of Operation: The area has probably been used since Plant B opened in 1974. It is an active unit.(17)

Wastes Managed: The wastes managed in this unit include the contents of Tank 335 (SWMU #16) and any product spillage of dibasic acids from product storage tanks.(17)

Release Controls: There are no release controls for this unit, other than that it is located within the facility's stormwater control area.

History of Releases: There is no documented history of release from this unit. During the VSI, liquid with an oily sheen was observed at the edge of the pad and running in the unlined ditch.(17)

### 5.21.2 Release Potential

- Soil/Groundwater: Apparent soil releases were noted during the VSI. There is a high potential for ongoing releases to soil and groundwater based on the observations during the VSI, and the unlined nature of the ditch adjacent to the transfer pad.

- Surface Water: The unit is within the stormwater control area of Plant B. There is no apprent potential for the release of hazardous constituents to surface water from this unit.

- Air: Based on the concentrated nature of both products and wastes managed at this unit, there is a low potential for release of hazardous constituents to air.

- <u>Subsurface Gas:</u> Based on the presence of hydrocarbons in wastes managed in this unit and the ongoing release to soil, there is a low to moderate potential for the generation of subsurface gas, if anaerobic conditions are created.

## 5.22 SWMU #22 - CONTAINER STORAGE BUILDING

### 5.22.1 Information Summary

Unit Description: Drum storage of hazardous wastes is located inside a prefabricated metal building located in the south portion of Plant A. The building is constructed on a concrete slab and has metal walls and roof.(5,17) It is not curbed around the inside. The hazardous waste drum storage portion of the building occupies approximately 300 square feet of the building (storage for 80 drums).(5)

Dates of Operation: It is unknown when this unit was constructed. This is an active unit.(17)

Wastes Managed: This area is used to store drums of unspecified hazardous wastes. Drum storage has been used for sand from the sandboxes (SWMU #20) and other unknown RCRA wastes.(17) Wastes in the drums are solidified.

Release Controls: The drums are contained inside a building with a bermed loading dock.(17)

History of Releases: At the time of the VSI, all drums were in good condition and no staining was evident on the floor.(17)

### 5.22.2 Release Potential

- Soil/Groundwater: Based on the location and good condition of the drums as observed during the VSI and the solidified state of the drum contents, there is no potential for soil or groundwater release from this building.

- Surface Water: Based on the location and good condition of the drums as observed during the VSI, there is no potential for surface water release from this building.

- Air: Based on the location and good condition of the drums as observed during the VSI and the solidified state of the drum contents, there is no potential for air release from this building.

- Subsurface Gas: Based on the location and good condition of the drums as observed during the VSI, there is no potential for subsurface gas generation from wastes stored in this building.

### 5.23 SWMU #23 - BONEYARD

#### 5.23.1 Information Summary

Unit Description: Located to the west of the Aeration Basins (SWMU #10) is an unpaved area used for the storage of scrap metals and salvaged equipment. At the time of the VSI, only inert materials were stored here.(17)

Dates of Operation: This is an active unit; the first dates of use are not known.(17)

Wastes Managed: The wastes in this area are inert scrap metals and salvaged equipment. There are no known hazardous wastes or constituents present.(17)

Release Controls: There are no release controls associated with this unit.(17)

History of Releases: There is no documented history of releases from this unit. No evidence of release was seen during the VSI.

#### 5.23.2 Release Potential

- Soil/Groundwater: There are no hazardous constituents present in this unit; therefore, there is no potential for releases.

- Surface Water: There are no hazardous constituents present in this unit; therefore, there is no potential for releases.

- Air: There are no hazardous constituents present in this unit; therefore, there is no potential for releases.

- Subsurface Gas: There are no hazardous constituents present in this unit; therefore, there is no potential for releases.

## 6.0 OTHER AREAS OF CONCERN

No other areas of concern were identified at the Dixie Chemical Company facility in the course of this assessment.

## 7.0 CONCLUSIONS AND RECOMMENDATIONS

### SWMU #1 - Twelve Plant A Process Area Sumps

Suggested Action: No further action at this time.

Reasons: These sumps are of concrete construction located within diked process areas. They were in good condition at the time of the VSI. No apparent potential exists for releases of hazardous constituents to soil, groundwater, or surface water.

### SWMU #2 - Six Plant B Process Area Sumps

Suggested Action: No further action at this time.

Reasons: These sumps are of concrete construction located within diked process areas. They were in good condition at the time of the VSI. No apparent potential exists for releases of hazardous constituents to soil, groundwater, or surface water.

### SWMU #3 - West Sump and Ditch

Suggested Action: Soil sampling.

Reasons: The ditch and sump carry stormwater and wastewater from the production of dibasic acid. The ditch is unlined. Liquids were present in the ditch at the time of the VSI. There is a high potential for soil and groundwater release from this unit.

### SWMU #4 - Area 100 South Ditch

Suggested Action: Soil sampling.

Reasons: The ditch carries stormwater from the process area 100 to a sump which leads to the wastewater treatment system. The ditch could handle hazardous constituents present in dilute concentrations in runoff or from spills in the process area. The ditch was wet at the time of the VSI. There is a high potential for the release of hazardous constituents to soil and groundwater.

SWMU #5 - Area 300/400 North Ditch

Suggested Action: Soil sampling.

Reasons: The ditch carries stormwater from the 300/400 Area to a sump which leads to the wastewater treatment system. The ditch could handle hazardous constituents present in dilute concentrations in runoff or from spills in the process area. The ditch was wet at the time of the VSI. There is a high potential for the release of hazardous constituents to soil and groundwater.

SWMU #6 - Biotatron

Suggested Action: No further action at this time.

Reasons: This unit now functions as an elementary neutralization unit. It has been closed as a RCRA unit, and no longer is used as a biological treatment system. Although the unit does not have secondary containment, it was in good condition at the time of the VSI.

SWMU #7 - Ponds A and B

Suggested Action: No further action at this time.

Reasons: These two ponds are being closed under an approved RCRA closure plan. They served as holding ponds for wastewater from the Plant A area, which was subsequently pumped to the Biotatron. Wastes have been solidified and removed, and the ponds have been filled in. A single monitoring well east of the ponds has shown high concentrations of organic constituents. Groundwater monitoring is ongoing.

SWMU #8 - Equalization Basin

Suggested Action: Liner condition evaluation.

Reasons: This pond receives wastewater and stormwater from Plant B. It is constructed below grade and equipped with a native clay liner. It is designed to overflow to the impoundment basin. There is a moderate potential for releases from this unit to soil and groundwater, and little potential for releases to surface water. An evaluation of the condition of the liner and penetration of liquid materials would serve to indicate the need for sampling under the ponds.

SWMU #9 - Impoundment Basin

Suggested Action: Liner condition evaluation.

Reasons: This pond receives wastewater and stormwater from the equalization basin. It is constructed below grade and equipped with a native clay liner. It is designed to pump wastewater to the aeration basins. There is a low potential for releases from this unit to soil and groundwater, and little potential for releases to surface water. An evaluation of the condition of the liner and penetration of liquid materials would serve to indicate the need for sampling under the ponds.

SWMU #10- North and South Aeration Basins

Suggested Action: No further action at this time.

Reasons: These units were RCRA regulated until the Biotatron was constructed in 1983. They received wastes with very low or high pH. The ponds were constructed with double liner and leachate systems. They have been operated at times with inadequate freeboard, but the potential for surface water release is very low.

SWMU #11- Tank T-1218

Suggested Action: No further action at this time.

Reasons: This tank was used for waste storage in the Plant A area. It is a closed, fixed roof tank located on a concrete pad. There is no apparent potential for releases from this tank as it contains manually controlled pumps and is located within a bermed area of the plant.

SWMU #12 - Tank T-1117

Suggested Action: No further action at this time.

Reasons: This tank was used for waste storage in the Plant A area. It is a closed, fixed roof tank located on a concrete pad. There is no apparent potential for releases from this tank as it contains manually controlled pumps and is located within a bermed area of the plant.

SWMU #13 - Tank T-105

Suggested Action: No further action at this time.

Reasons: This tank was used for waste storage in the Plant A area. It is a closed, fixed roof tank located on a concrete pad. There is no apparent potential for releases from this tank as it contains manually controlled pumps, is connected to Tank T-107, and is located within a bermed area of the plant.

SWMU #14 - Tank T-107

Suggested Action: No further action at this time.

Reasons: This tank was used for waste storage in the Plant A area. It is a closed, fixed roof tank located on a concrete pad. There is no apparent potential for releases from this tank as it contains manually controlled pumps, is connected to Tank T-105, and is located within a bermed area of the plant.

SWMU #15 - Tank T-305

Suggested Action: No further action at this time.

Reasons: This tank was used for waste storage in the Plant A area. It is a closed, fixed roof tank located on a concrete pad. There is no apparent potential for releases from this tank as it contains manually controlled pumps and is located within a bermed area of the plant.

SWMU #16 - Tank T-335

Suggested Action: Soil sampling.

Reasons: This tank is the only tank on the property which is continually used for the storage of hazardous wastes. It is a RCRA regulated unit. The tank is on a concrete pad within the tank farm, but is surrounded by soil. There is a moderate potential for the release of hazardous constituents to soil, based on the volume of wastes handled and the lack of secondary containment.

SWMU #17 - Drum Wash Area

Suggested Action: No further action at this time.

Reasons: The drum wash area is an inactive area where drums were once triple-rinsed prior to reuse or off-site disposal. The area is constructed of concrete and is curbed. It contains a sump in the middle to receive drainage which subsequently is treated in the plant's wastewater treatment system. There is no apparent potential for releases to soil, groundwater or surface water.

SWMU #18 - Temporary Drum Storage Area

Suggested Action: No further action at this time.

Reasons: This drum storage area, located next to the drum wash area, is on concrete. There is no apparent potential for releases to soil, groundwater, or surface water.

SWMU #19 - Spray Dryer and Baghouse

Suggested Action: No further action at this time.

Reasons: This inactive unit was used for drying of unspecified products prior to packaging and shipping. It is equipped with a baghouse for the control of dusts. The unit was in good condition with no evidence of release visible during the VSI.

SWMU #20 - Two Plant A Sandboxes

Suggested Action: No further action at this time.

Reasons: The sandboxes in Plant A are used to prevent drippage and minor leaks from product transfer from pipelines to trucks from reaching the ground. The sand in the boxes is removed as needed, drummed and stored in the container storage building prior to off-site removal. The units were in good condition during the VSI.

SWMU #21 - Plant B Truck Transfer Area

Suggested Action: Soil sampling.

Reasons: This transfer area is used for the transfer of wastes and products from pipelines to tanker trucks. Although the transfer point itself is on a concrete pad, spills, leaks, and runoff enter an unlined ditch adjacent to the pad. There is a high potential for the release of hazardous constituents to soil and groundwater from this unit.

SWMU #22 - Container Storage Building

Suggested Action: No further action at this time.

Reasons: The container storage building is located in Plant A. A portion of it is used for the storage of hazardous wastes in drums for less than 90 days. The building and stored waste materials were in excellent condition at the time of the VSI. There is no apparent potential for the release of hazardous constituents from this unit.

SWMU #23 - Boneyard

Suggested Action: No further action at this time.

Reasons: The boneyard, located in Plant B, is used for the storage of scrap metal and other inert materials. No wastes containing hazardous constituents are present in this area.

## 8.0 REFERENCES


1. Dixie Chemical Company. 11/18/80. RCRA Part A Notification to EPA.

2. Texas Water Commission. 5/4/87. Notice of Registration, Solid Waste Management, Dixie Chemical Company.

3. Dun and Bradstreet. 7/26/86. Dixie Chemical Company Business Profile.

4. Schaezler, D.J. 11/9/83. Letter from S&B Laboratories to D. Martin, Texas Department of Water Resources.

5. S & B Engineers. 12/14/84. Closure Plan for Dixie Chemical Company, Bayport Plant, Pasadena, Texas.

6. Coloton, M.J. 3/27/84. Memo from Texas Department of Water Resources to G. Schroeder, Texas Department of Water Resources.

7. Perrin, J.K. 3/29/84. Letter from Dixie Chemical Company to C. Nemir, Texas Department of Water Resources.

8. Corrigan, G. 5/1/84. Memo from Texas Department of Water Resources to B. Dixon, Texas Department of Water Resources.

9. St. Clair, J.H. 11/7/85. Letter from S&B Engineers to J. Perrin, Dixie Chemical Company.

10. Texas Water Commission. 4/86. Comprehensive Groundwater Monitoring Report, Dixie Chemical Company, Inc.

11. Texas Water Commission. 5/86. TWC Solid Waste Inspection Report, Dixie Chemical Company.

12. Perrin, J.K. 7/9/86. Letter from Dixie Chemical Company to I.J. Szekelyhidi, Western Waste Industries of Texas, Inc.

13. Ayers, D.G. 8/20/86. Memo from EPA Chief, Houston Branch to S. Becker, EPA Chief, Hazardous Waste Compliance Branch.

14. Perrin, J.K. 2/17/87. Letter from Dixie Chemical Company to L. Soward, Texas Department of Water Resources.

15. Perrin, J.K. 4/15/86. Letter from Dixie Chemical Company to M. Long, Texas Water Commission.

16. Texas Water Commission. 9/86. Comprehensive Groundwater Monitoring Report, Dixie Chemical Company, Inc.

17. Visual Site Inspection. 7/14-15/87. Dixie Chemical Company.

18. Dixie Chemical Company. 10/82. RCRA Part B Permit Application for Dixie Chemical Company.

19. Gabrysh, R.K. 1980. Development of Groundwater in the Houston District, Texas, 1970-1974. Texas Department of Water Resources, Report 241.

20. USDA, Soil Conservation Service. 5/86. Soil Survey of Chambers County, Texas. U.S. Government Printing Office, Washington, D.C.

21. S&B Engineers. 6/23/86. Groundwater Quality Investigation Plant, Dixie Chemical Company, Bayport Facility, Registration No. 30314.

22. Kirk-Othmer. 1985. Concise Encyclopedia of Chemical Technology. John Wiley and Sons, New York.

# Appendix A

## VSI PHOTOGRAPHS

**Reference 4**

II D 5

# CLEAN-CLOSURE REVIEW

Dixie Chemical Company
Pasadena, Texas

EPA I.D. No. TXD008088247

Prepared for:

U.S. Environmental Protection Agency
Region VI
1445 Ross Avenue
Dallas, Texas 75202-2733

Prepared by:

Kearney/Centaur Division
A.T. Kearney, Inc.
225 Reinekers Lane
Alexandria, Virginia 22314

Contract No. 68-01-7374
Work Assignment No. R26-02-20

December 1988

DIXIE CHEMICAL COMPANY
PASADENA, TEXAS
EPA I.D. NO. TXD008088247

## I. DESCRIPTION OF FACILITY

Dixie Chemical Company (Dixie) is located in Pasadena, Texas. The facility has manufactured packaged ethylene glycol and many other organic chemicals since 1970. The facility generates waste streams which exhibit the characteristic of corrosivity (D002) and also includes wastes that meet EP toxicity criteria for mercury (D009).

The facility submitted a Part A Permit Application on November 1, 1980 which included four tanks ranging in capacity from 4,000 to 10,000 gallons (Ref. 28). During a solid waste compliance inspection on August 30, 1983, an additional tank and six surface impoundments were noted (Ref. 25). The facility's Part A Hazardous Waste Permit Application did not include these units as required in order to operate under interim status. Texas Department of Water Resources (TDWR) issued a notice of violation to Dixie on December 30, 1983 (Ref. 25). Dixie responded to the notice of violations and indicated their intention to close all surface impoundments as hazardous waste facilities and to redesign their wastewater collection system to prevent unauthorized discharges, but no time schedule was submitted.

Dixie's plant is bisected by a stormwater canal, with the western portion designated "Plant A" and the eastern portion "Plant B". The process water and stormwater from Plant A are channeled to surface impoundments (Ponds A and B) from which wastewater is transferred to a 10,000-gallon capacity steel tank which is referred to as the Biotatron Tank. Some neutralization occurs in the Biotatron Tank before pumping to the Equalization Basin impoundment in Plant B. The Equalization Basin also accepted process water and stormwater from Plant B. The wastewater in the Equalization Basin is reported to have a pH greater than 12.5 at least once a month. Wastewater with high total oxygen demand (TOD) was pumped directly to the impoundment basin which was located adjacent to the Equalization Basin. The wastewaters from the equalization and impoundment basins were discharged to two Aeration Basins that are lined with geomembrane liners. Dixie noted holes in the geomembrane liners which were later repaired (Ref. 26). The effluent from the Aeration Basin was discharged to the Gulf Coast Waste Disposal Authority for further treatment.

Dixie submitted a closure plan to the Texas Water Commission (TWC) on September 10, 1984 for six surface impoundments (Ponds A and B, equalization and impoundment basin, and two aeration basins) and the Biotatron Tank. The closure plan was amended on April 12, 1985 by the facility. TWC approved the closure plan on May 2, 1985. The Equalization and Aeration Basins were closed and the closure certification by an independent, registered professional engineer was submitted to TWC on November 7, 1985. TWC recommended approval of the closure certification on February 24, 1988.

Regarding the closure of Ponds A and B, TWC required verification and certification of the absence of Appendix VIII hazardous waste constituents acetonitrile, acrylonitrile, epichlorohydrin in the groundwater monitoring wells surrounding the ponds, and a demonstration that the groundwater samples do not exhibit the characteristics of ignitability, corrosivity, reactivity, or EP toxicity (Ref. 17). TWC also required a groundwater verification program for four quarters. Accordingly, if no hazardous wastes were detected after two quarters, then closure will be certified by the state. However, monitoring will continue for two more quarters.

Additionally, TWC asked Dixie to submit a groundwater quality assessment plan to evaluate the horizontal and vertical extent of groundwater contamination and the remedial action plan (Ref. 11).

Regarding the closure of the Biotatron Tank and the Container Storage Area, TWC asked Dixie to close these units as described in the approved closure plan. A certification of closure of the Biotatron Tank was submitted by the facility on February 17, 1987 (Ref. 11).

Subsequent testing of the sludge in the Biotatron Tank and Ponds A and B exhibited the hazardous characteristics of ignitability and contained greater than 2,400 ppm sulfide (Ref. 17).

A hydrogeologic investigation, conducted in response to the TWC requirement for the presence of Appendix VIII constituents confirmed the presence of volatile organic compounds in the vicinity of Ponds A and B. The major volatile organic constituents have been determined as trichloroethylene, trans-1,2-dichloroethylene and vinyl chloride (Ref. 17). Also, the flow pattern in the near surface aquifer was found to be reversible and related to the water level in the stormwater canal bisecting the plant. Flow beneath Plant A has been observed to flow eastward to the canal at the time of low canal water levels. A corrective action plan to remediate the groundwater contamination is underway (Ref. 10).

Subsequent to closure certification of the equalization basin, impoundment basin, aeration ponds, and Biotatron Tank, these units will function as non-hazardous waste facilities. Details of closure certification of the Biotatron Tank were not available for review and therefore no specific comments for this tank are included.

The file review also showed the following:

- There was no testing of the loading/unloading areas.
- No clean closure of the tanks and container areas was provided or documented.
- Dixie solidified hazardous materials and called them non-hazardous without going through the delisting process per 40 CFR Part 260.

## II. SURFACE IMPOUNDMENTS A AND B and the Biotatron Tank

The closure plan and closure certification reports, including a final report on the hydrogeologic site investigation, have been reviewed with the objective of determining what procedures were used by TWC to allow clean closure for Ponds A and B and the Biotatron Tank. A checklist is completed for Ponds A and B and the Biotatron Tank. Attachment No. 1 includes general information about the units; Attachment Nos. 2 and 3 include unit-specific information about the surface impoundment and the Biotatron Tank. Key observations resulting from this review are summarized below:

- Background soil samples were not analyzed to determine if waste constituents had been removed to background levels.
- Mercury contamination has not been addressed in the closure plan although mercury waste was listed in the Part A Permit Application.
- Groundwater sampling plan does not address sampling for mercury. Since mercury is a sinker, the groundwater sampling may not be adequate for mercury.
- Screen length in monitoring wells MW-9, MW-10 and MW-11 in excess of 20 feet may result in dilution of volatile organic compounds.
- The Bentonite seal is reported to be only 12 inches. A minimum of two feet of seal is recommended by EPA in the "RCRA Groundwater Monitoring Technical Enforcement Guidance Document."
- TWC has not certified clean closure because of documented groundwater contamination.
- Relatively high permeability of soils under existing hydraulic gradients may cause transport of contaminants off-site if not corrected.
- Groundwater monitoring for four quarters appears inadequate. Monitoring for longer periods may be appropriate to establish effectiveness of clean-closure.
- Testing should have been performed outside the ponds since it appears they were overtopped.

CHECKLIST TO EVALUATE STATE CLEAN-CLOSURE
DETERMINATIONS IN EPA REGION VI

GENERAL

ATTACHMENT NO. 1

(Complete Sections I through IV for Entire Facility)

## I. GENERAL INFORMATION

A. Facility Name: Dixie Chemical Co., Inc.

B. EPA I.D. No.: TXD008088247

C. Address: 10701 Bay Area Boulevard, Pasadena, Texas 77507

D. Check the type of unit/units closed or proposed to be closed and indicate the number of each type of unit that is being reviewed:

(X) Surface Impoundment 6 - Ponds A & B, North and South Aeration Basins, Equalization Impoundment and Impoundment Basin
( ) Landfill ____
( ) Waste Pile ____
( ) Container Storage ____
(X) Tank 5 (less than 90 day storage) of concern - Biotatron Tank, Container Storage
( ) Land Treatment ____
( ) Other (Describe) ____

## II. INFORMATION SOURCE(S)

A. Check type of materials reviewed in completing the evaluation and provide the date of the documents:

(X) Part A Permit Application: 11/14/80 (Ref. 28)
(X) Part B Permit Application: On microfiche at TWC, Austin, TX
(X) Interim Status Closure Plan: 12/14/84; 1st amended - 4/12/85, approved 5/2/85; 2nd - 1/15/86; 3rd - 7/9/86 (Refs. 13, 19, 20)
( ) RCRA Permit: Interim status
(X) RCRA Facility Assessment: 7/27/87 (Ref. 3)
(X) Closure Certification: 11/7/85 for Equalization Impoundment, North & South Basins; 2/12/87 for Biotatron, A&B Ponds, Container Storage Area; 2/17/87 is cover letter for 2/12/87 (Ref. 6).
(X) CME Report: 7/9/86 (Refs. 8, 12)
( ) Consent Agreement
(X) Sampling Results: Report on Closure Activities, 7/24/85 (Ref. 17)

II. INFORMATION SOURCE(S) (Cont'd)

A. Check type of materials reviewed in completing the evaluation and provide the date of the documents (Cont'd):

(X) Enforcement Report: 3/27/84 - Inspection noted in 1 tank and 6 surface impoundments not disclosed, not included in Part A (Ref. 25)

(X) Partial Closure Plan: 3/29/84 - Submitted to TDWR (Ref. 22)

( ) Other Correspondence (Describe): Conference date 8/18/87, NOV - groundwater contamination (Ref. 4)

(X) Other Materials (Describe): RFA reports are available at SAIC as sub for A.T. Kearney; letter 5/5/87, refuting contamination (Ref. 3) IOM to files, 2/24/88 (Ref.1).

B. Briefly summarize interviews with Region and/or State personnel. Include the name(s) of the personnel interviewed and the date:

III. ENVIRONMENTAL SETTING

A. Source of Data - Cite Reference Noted in Section II: Ref. 3

B. Surface Water

(1) Annual Precipitation: 50 inches

(2) Annual Evaporation: 51 inches

(3) Net Annual Precipitation: negligible

(4) Distance to Nearest Surface Water and Description: Storm water canal divides plant into 2 separate sites (Gulf Coast Authority Canal)

(5) Describe Facility Slope and Intervening Terrain: Surface water drains toward the canal from Plants A & B

III. ENVIRONMENTAL SETTING (Cont'd.)

C. Geology

(1) Describe Soil Type:
( ) Cohesionless
(X) Cohesive

(2) Predominant Soil Type in Accordance with USCS Classification System:
(X) Clay
(X) Silty Clay
( ) Sandy Clay
( ) Clayey Silt/Clayey Sand
(X) Sandy Silt/Silty Sand - 17-26'--being monitored for groundwater
( ) Other

(3) Test Results of Permeability:
( ) Less than $1x10^{-7}$ cm/sec
(X) Greater than $1x10^{-7}$ cm/sec

(4) Test Procedures: Laboratory__________; Field: Rising Head
Describe: Rising Head Slug Test

(5) Is there consistency in test results of permeability?
(X) Yes ( ) No
Describe inconsistency(ies?) ____________________

(6) Soil Stratification:
(X) Interbedded Soil Layers: A clay layer up to 23 feet thick was encountered. This layer is underlain by up to 27 feet thick of silty sand and sandy silt which in turn is underlain by a 15 foot thick clay layer (Ref. 7)
( ) Continuous Layer
( ) Discontinuous Soil Horizon
( ) Other

D. Hydrogeology

(1) Source of data - cite reference noted in Section II:
Refs. 5, 7, 12, 13, 17, 19, 20, 29, 30

(2) Depth to groundwater: Feet: 5-13' ; Elevation -

(3) Direction of groundwater flow: Regional southeast flow, based on TDWR Report #241

(4) Is the site's groundwater flow direction different from regional flow direction? (X) Yes ( ) No

III. ENVIRONMENTAL SETTING (Cont'd.)

(5) If yes, flow direction is altered because of:
(X) Drawdown induced by pumping
( ) Topographic features
( ) Structural features
( ) Other(s) (Describe) __________

(6) Presence of monitoring wells on site? (X) Yes ( ) No
3 proposed wells

(7) If yes, have unit specific constituents been detected?
(X) Yes ( ) No VOC contamination (Ponds A&B)
Indicate last sampling date: __________

(8) Is contamination statistically significant?
(X) Yes ( ) No

(9) Are primary drinking water standards exceeded?
(X) Yes ( ) No

If yes, indicate constituents and levels detected: Trichloroethylene, trans, 1-2-dichloroethylene and vinyl chloride

(10) Are secondary drinking water standards exceeded?
( ) Yes ( ) No (X) Unknown

If yes, indicate constituents and levels detected: __________

E. Receptor

(1) Source of data - cite reference noted in Section II: Part A (state)
Note: Facility located in 100-year floodplain

(2) Population within one-mile radius: No wells at the facility

(3) Population within three-mile radius: NIF

(4) Source and distance of potable water supply:
( ) Surface water Canal divides Plant A&B
(X) Municipal wells
( ) Private well No water supply wells in 1 mile radius of Dixie Chemical

(5) Indicate depth to aquifer supplying drinking water: 1400' BSL

(6) Indicate endangered species in the area: NIF

## IV. HEALTH AND SAFETY PROCEDURES

A. Is proposed decontamination of construction equipment described in sufficient detail? ( ) Yes (X) No

If no, describe specific deficiencies: Very little information on the procedures for decontamination.

B. Is rinsate disposal adequately described?
( ) Yes (X) No

Final disposition of rinsate unspecified.

ATTACHMENT NO. 2

SURFACE IMPOUNDMENT
(RETENTION PONDS A&B)

(Complete Sections V through IX for Each Unit Under Review)

V. UNIT DESCRIPTION

A. Type of Unit:
(X) Surface Impoundment
( ) Landfill
( ) Waste Pile
( ) Container Storage
( ) Tank
( ) Land Treatment
( ) Other

B. Name, location or other information to identify the unit: Retention Ponds A&B, located east of Biotatron Tank in Plant A.

C. Regulatory Basis for Closing the Unit (May Be More Than One):
(X) 40 CFR 265
( ) 40 CFR 264
( ) Consent Agreement
( ) Waste accepted to the unit prior to July 26, 1982
( ) Waste accepted to the unit after July 26, 1982
(X) Unit closed after January 26, 1983

D. Did the State perform a site visit? (X) Yes ( ) No

If yes, indicate the name of the person conducting site visit, date and nature of the visit: NIF*

Summarize key findings of the visit including the status of clean-closure activity: Letter 2/24/88, Interoffice Memorandum documenting contamination of groundwater; groundwater assessment plan submitted 9/2/87, writer's (state) recommendation to approve

E. Closure Plan Approval Date by the State: 5/2/85 (Ref. 11, 16)

F. Closure Certification: (X) Yes ( ) No

If no, indicate schedule for Closure Certification: ____

G. Is Closure Certification by a:
(X) Professional Engineer
(X) Independent Engineer
(X) Plant Engineer
( ) Other Person ____

* NIF - No information found during the file search process.

V. UNIT DESCRIPTION (Cont'd.)

H. Is Closure Certification approved by the State?
( ) Yes (X) No

If no, describe the basis for non-approval: Closure for several units approved. However, closure of Ponds A&B has to be implemented by the facility maintenance with approved closure plan.

I. Dimensions of Unit: 1983 - 50'x20'x3; 1968 - 100'x100'x10
Groundwater Quality Investigation Plan - 6/23/86

(1) Dimensions: Length 90', Width 30', Depth 6'

(2) Year of Construction:
Start-Up Date: 1968
Inactive Date:
Closure Date: Certified closure on 2/14/87 (Ref. 6)

(3) Was a Liner(s) Required: ( ) Yes (X) No

(4) If Yes, Liner Type and Brief Description: NA
( ) Liner not installed, as required
( ) Clay liner
( ) Geomembrane liner
( ) Combination of clay and geomembrane liner

(X) Other liner (Describe): Shallow earthen impoundments with small gravel dikes

Briefly describe, the appropriateness of the liner for the site:

J. Physical Status of the Unit: NA

(1) Thickness of liner(s)

(2) QA/QC documentation

(3) Briefly describe any problems identified with the liner:

K. History of Compliance/Enforcement Problems: (X) Yes ( ) No

L. If Yes, Describe Compliance/Enforcement Action: Groundwater contamination with volatile organic compounds, performance of wastewater treatment system and drum washing facility

M. Documents Reviewed by the State:
Design Plan (X) As Built Drawings (X)

Briefly discuss the adequacy of these documents: Closure plan not detailed

V. UNIT DESCRIPTION (Cont'd.)

N. State's Basis for Approval of Clean-Closure: If waste constituents concentration less than those established by the state. IOM to TWC's files recommends approval of closure certification (Ref. 1).

O. Describe proposed final use in the area of the unit: Not addressed

VI. WASTE CHARACTERIZATION

A. Source of Data - Cite Reference Noted in Section II: Ref. 17

B. Waste Managed
(X) Listed Waste (Describe Waste or Waste Types): acetonitrile (U003), acrylonitrile (U009), epichlorohydrin (U041).
(X) Characteristics
  (X) Ignitability
  (X) Corrosivity: < 2.0 pH > 12.5
  (X) Reactivity (possibility)
  ( ) Toxicity
(X) Appendix VIII Hazardous Constituents (Describe): Sulfide concentration. Pond A = 2430 ppm, Pond B = 3830 ppm; no heavy metal concentration in excess of EP Toxic levels noted; acetonitrile, acrylonitrile, epichlorohydrin concentrations ranged from 0 to 952 ppm.
(X) Other hazards that pose a threat to public health and the environment (Describe): Note: Sludge tested to be ignitable in Pond A at 85°F; in Pond B 109°F. Some concentrations of CN detected. (Pond A = 0.59 ppm, Pond B = 0.79 ppm).

C. Quality Control procedures used in testing: (X) Yes ( ) No

D. If yes, were the procedures used adequate? (X) Yes ( ) No

If no, describe deficiencies:

## VII. WASTE REMOVAL/DECONTAMINATION

A. Source of Data - Cite Reference Noted in Section II: Ref. 17

B. Cleanup Standards

(1) Cleanup standards used:
( ) Background
( ) Health based
(X) Other (Describe): Proposed by Dixie Chemical Company

(2) Who established cleanup standards?
(X) State
( ) EPA
(X) Proposed by Applicant

(3) Basis for determining cleanup criteria: Presence of hazardous constituents in the waste

(4) Describe any numerical standards that were used to establish cleanup criteria: Appears to be detection of hazardous waste

(5) Explain the adequacy of cleanup criteria: Clean-up criteria do not address groundwater contamination issue. No documentation of soil contamination in the impoundment being brought to background concentrations.

(6) Indicate Quality Assurance/Quality Control procedures used in establishing cleanup criteria: QA/QC program should have been presented in detail.

C. Waste Removal

(1) How was waste disposed? Solidified and moved off-site by Waste Processor Industries

(2) Manifest for material moved off site: ( ) Yes ( ) No (X) Unknown

D. Liner, associated piping and contaminated subsoil removal:

(1) Source of data - cite reference noted in Section II: Refs. 13, 14, 16, 17, 19, 20

(2) Geomembrane liner: Not Applicable
( ) Removal off site
( ) Decontamination (treated)
( ) Disposal on site after treatment

Describe decontamination procedure:

VII. WASTE REMOVAL/DECONTAMINATION (Cont'd.)

(3) Soil:
(X) Removal off site
( ) Decontamination (treated)
( ) Disposal on site after treatment)

Describe decontamination procedure: Interior dike was removed along with sludge.

(4) Sampling scheme to characterize contamination in underlying soil:
(X) Systematic
( ) Random

(5) How was material disposed off site? Note: Soil sampling confirmed contamination in Pond A dike wall. Contaminated material proposed to be disposed along with Pond A&B sludges

(6) Manifest for material moved off site: (X) Yes ( ) No

(7) Contaminated subsoil testing for waste constituents?
(X) Yes ( ) No

(8) Is location of background soil sampling correct?
( ) Yes (X) No

If no, describe the deficiencies: No background soil sampling and testing for waste constituents reported

(9) Nature of soil samples tested:
( ) Grab (center of quadrant)
(X) Composite

Indicate depth of soil sampled: Shallow. 7 samples collected and tested for acetometrile, acrolein, intrile, epichlorohydrin, pH, TCOD, specific conductivity. Results: plant slightly higher; conductivity much higher; soil sample conclusions--results have nothing to do with hazardous waste

(10) Is contamination of underlying soil adequately described?
( ) Yes (X) No

If not, describe deficiencies: Underlying soil testing program limited to selected few constituents

(11) Decontamination/removal of leachate collection/removal system:
( ) Yes ( ) No NA

VII. WASTE REMOVAL/DECONTAMINATION (Cont'd.)

E. Waste Removal from Surface Impoundment:

(1) Source of data - cite reference noted in Section II: Ref. 17

(2) Were liquid and sludges treated and/or stabilized? Yes

(3) Was procedure for removal of any liquid waste adequate?
(X) Yes ( ) No

(4) Describe liquid waste removal procedure and name of facility accepting waste: Name of the accepting facility not included in Report on Closure Activities (Ref. 17)

(5) Was the plan for handling sludge adequate?
(X) Yes ( ) No

If no, describe deficiencies:

(6) Manifest for off-site waste: ( ) Yes ( ) No (X) NIF

F. Cleanup of Groundwater?:

(1) Describe how potential contamination of groundwater was addressed as a part of clean closure: Groundwater contamination in the proximity of Pond A&B by volatile organic compounds has been determined. A corrective action plan by the facility is underway

(2) Did the unit have groundwater monitoring wells?
(X) Yes ( ) No

If no, did the Agency issue a waiver? ( ) Yes ( ) No

If yes, did the wells detect waste constituents? (X) Yes ( ) No

(3) Is groundwater monitoring required under clean closure?
(X) Yes ( ) No

(4) Describe how the potential for release of waste constituents into the groundwater was reconciled as a part of clean closure: Releases of waste constituents into the groundwater are being addressed by the facility's corrective action plan.

## VIII. OTHER CONSIDERATIONS

A. Describe any other available criteria used for the unit:
NIF

B. Was the clean-closure of the unit affected by the financial condition of the facility? ( ) Yes (X) No

C. Did the unit's location with respect to population affect the closure of the unit? ( ) Yes (X) No

If yes, describe:

D. Was the unit's closure approvals affected by local constraints?
( ) Yes (X) No

If yes, describe the circumstances:

## IX. OTHER COMMENTS

1. Groundwater contamination with vinyl chloride, trichloroethylene and trans-1,2-dichloroethylene in the proximity of Ponds A&B has been documented. A corrective action plan to remediate groundwater is underway.

2. Screen length of the monitoring wells range from 10-24 feet. Screen length in excess of 15 feet may cause dilution of waste constituents in groundwater. Waste constituent concentrations may have been underestimated.
3. Contaminants may move off-site because of relatively high permeability ($5 \times 10^{-3}$ cm/sec) of underlying soils.

ATTACHMENT 3
BIOTATRON TANK
CHECKLIST TO EVALUATE
STATE CLEAN-CLOSURE DETERMINATIONS
IN EPA REGION VI

V. UNIT DESCRIPTION

A. Type of Unit:
( ) Surface Impoundment
( ) Landfill
( ) Waste Pile
( ) Container Storage
(X) Tank (Biotatron Tank)
( ) Land Treatment
( ) Other

B. Name, location or other information to identify the unit: ______________

C. Regulatory Basis for Closing the Unit (May Be More Than One):
(X) 40 CFR 265
( ) 40 CFR 264
( ) Consent Agreement
( ) Waste accepted to the unit prior to July 26, 1982
( ) Waste accepted to the unit after July 26, 1982
( ) Unit closed after January 26, 1983

D. Did the State perform a site visit? (X) Yes ( ) No

If yes, indicate the name of the person conducting site visit, date and nature of the visit: NIF

Summarize key findings of the visit including the status of clean-closure activity:: Sludge in the tank has been determined to exhibit the characteristics of ignitability and possibly reactivity (Ref. 14).

E. Closure Plan Approval Date by the State: May 2, 1985, February 17, 1987 (Ref. 16, 6)

F. Closure Certification: (X) Yes ( ) No

If no, indicate schedule for Closure Certification: ______________

V. UNIT DESCRIPTION (Cont'd.)

G. Is Closure Certification by a:
(X) Professional Engineer
(X) Independent Engineer
(X) Plant Engineer
( ) Other Person ______

H. Is Closure Certification approved by the State?
( ) Yes (X) No

If no, describe the basis for non-approval: hazardous waste has to be disposed of properly; need to amend the closure plan.

I. Dimensions of Unit

(1) Dimensions: Length ______, Width ______, Depth ______
(10,000 gal. capacity)

(2) Year of Construction:
Start-Up Date 1968
Inactive Date ______
Closure Date February 17, 1987

(3) Was a Liner(s) Required: ( ) Yes (X) No ( ) NA

(4) If Yes, Liner Type and Brief Description: Not Applicable
( ) Liner not installed, as required
( ) Clay liner ______
( ) Geomembrane liner ______
( ) Combination of clay and geomembrane liner ______
( ) Other liner (Describe) ______

Briefly describe, the appropriateness of the liner for the site:

J. Physical Status of the Unit: NA

(1) Thickness of liner(s) ______

(2) QA/QC documentation ______

(3) Briefly describe any problems identified with the liner:

K. History of Compliance/Enforcement Problems: (X) Yes ( ) No

L. If Yes, Describe Compliance/Enforcement Action: Not originally included in the Part A Permit Application; Notice of Violation issued. (Ref. 25)

V. UNIT DESCRIPTION (Cont'd.)

M. Documents Reviewed by the State:
Design Plan (X) As Built Drawings (X)

Briefly discuss the adequacy of these documents: Very brief. A detailed description of the closure is needed.

N. State's Basis for Approval of Clean-Closure: Lack of Appendix VIII hazardous waste constituents in the subsoil and groundwater. TWC recommends approval of closure certification in IOM to TWC files (Ref. 1).

O. Describe proposed final use in the area of the unit: Will be used elementary neutralization facility per requirements in TAC 335.2(f) and 335.41(d)(1).

VI. WASTE CHARACTERIZATION

A. Source of Data - Cite Reference Noted in Section II: (Refs. 14, 19, 17)

B. Waste Managed
( ) Listed Waste (Describe Waste or Waste Types):

(X) Characteristics
(X) Ignitability
(X) Corrosivity
(X) Reactivity
( ) Toxicity

Note: Hazardous waste identified, closure plan will be amended to address treatment and disposal of sludges in Biotatron Tank. Flashpoint <140F.

( ) Appendix VIII Hazardous Constituents (Describe) Sulfide concentrations found to be 2850 ppm.

( ) Other hazards that pose a threat to public health and the environment (Describe) Biotatron sludge ignitability found to be 110 F. (Ref. 14).

C. Quality Control procedures used in testing: (X) Yes ( ) No

D. If yes, were the procedures used adequate? ( ) Yes (X) No

If no, describe deficiencies: Test results of sulfide are questioned because of testing procedures used (Ref. 15).

## VII. WASTE REMOVAL/DECONTAMINATION

A. Source of Data - Cite Reference Noted in Section II: (Ref. 17, 19)

B. Cleanup Standards

(1) Cleanup standards used:
( ) Background
( ) Health based
(X) Other (Describe) Lack of hazardous constituents per TAC 335.286b (Ref. 14)

(2) Who established cleanup standards?
(X) State
( ) EPA
(X) Proposed by Applicant

(3) Basis for determining cleanup criteria: Lack of hazardous constituents TAC 335.286b (Ref. 14)

(4) Describe any numerical standards that were used to establish cleanup criteria:

(5) Explain the adequacy of cleanup criteria: Some of the waste may remain in place in comparison to background concentration.

(6) Indicate Quality Assurance/Quality Control procedures used in establishing cleanup criteria:

C. Waste Removal

(1) How was waste disposed? Waste disposed off-site

(2) Manifest for material moved off site: ( ) Yes ( ) No (X) Unknown

D. Liner, associated piping and contaminated subsoil removal: Not Applicable

(1) Source of data - cite reference noted in Section II:

(2) Geomembrane liner:
( ) Removal off site
( ) Decontamination (treated)
( ) Disposal on site after treatment

Describe decontamination procedure:

VII. WASTE REMOVAL/DECONTAMINATION (Cont'd.)

(3) Soil/clay liner: Not Applicable
( ) Removal off site
( ) Decontamination (treated)
( ) Disposal on site after treatment)

Describe decontamination procedure: ______

(4) Sampling scheme to characterize contamination in underlying soil:
( ) Systematic None Reported
( ) Random

(5) How was material disposed off site? ______

(6) Manifest for material moved off site: ( ) Yes ( ) No ( ) Unknown

(7) Contaminated subsoil testing for waste constituents?
( ) Yes (X) No

(8) Is location of background soil sampling correct?
( ) Yes (X) No

If no, describe the deficiencies: No background soil samples tested.

(9) Nature of soil samples tested: None
( ) Grab
( ) Composite

Indicate depth of soil sampled: ______

(10) Is contamination of underlying soil adequately described?
( ) Yes (X) No

If not, describe deficiencies: Not addressed in the closure plan.

(11) Decontamination/removal of equipment:
( ) Yes (X) No Equipment proposed to be only washed with water.

E. Waste Removal from Surface Impoundment Not Applicable
(1) Source of data - cite reference noted in Section II: ______

(2) Were liquid and sludges treated and/or stabilized?
______

VII. WASTE REMOVAL/DECONTAMINATION (Cont'd.)

(3) Was procedure for removal of any liquid waste adequate?
( ) Yes ( ) No

(4) Describe liquid waste removal procedure and name of facility accepting waste: ______

(5) Was the plan for handling sludge adequate?
( ) Yes ( ) No

If no, describe deficiencies: ______

(6) Manifest for off-site waste: ( ) Yes ( ) No

F. Cleanup of Groundwater:

(1) Describe how potential contamination of groundwater was addressed as a part of clean closure: An integrated groundwater remediation program is underway (Ref. 1).

(2) Did the unit have groundwater monitoring wells?
( ) Yes (X) No

If no, did the Agency issue a waiver? ( ) Yes (X) No

If yes, did the wells detect waste constituents? ( ) Yes ( ) No

(3) Is groundwater monitoring required under clean closure?
(X) Yes ( ) No

(4) Describe how the potential for release of waste constituents into the groundwater was reconciled as a part of clean closure: No separate monitoring system in place, but addressed separately under a corrective action program.

VIII. OTHER CONSIDERATIONS

A. Describe any other available criteria used for the unit: NIF

B. Was the clean-closure of the unit affected by the financial condition of the facility? ( ) Yes (X) No

VIII. OTHER CONSIDERATIONS (Cont'd)

C. Did the unit's location with respect to population affect the closure of the unit? ( ) Yes (X) No

If yes, describe:______________________________

D. Was the unit's closure approvals affected by local constraints? ( ) Yes (X) No

If yes, describe the circumstances:______________________________

IX. OTHER COMMENTS

Clean closure of the Biotatron Tank is certified by the facility. A closure documentation report was not available for review. TWC has not certified clean-closure because of documented groundwater contamination.

X. REFERENCES


1. Letter to Luis Campos, TWC, from John A. Connor, Dixie Chemical Company, Re: Groundwater Recovery System, October 14, 1988.
2. Solid Waste Inspection Report, January 15, 1988.
3. RCRA Facility Assessment conducted by A.T. Kearney, Inc., August 27, 1987.
4. Conference Record, between David Buchanan, John Perrin and John Connor of Dixie Chemical Company, Inc., Re: Notice of Violation, August 18, 1987.
5. TWC Interoffice Memorandum, to Russ Kimble from Mac Vilas, Re: Closure Verification Sampling of Ponds A and B, May 29, 1987.
6. Letter to Larry Soward, TWC, from John Perrin, Dixie Chemical Company, Re: Certification of Closure, Dixie Chemical Company's Biotatron Tank, A and B Ponds and Container Storage Area, February 17, 1987.
7. Final Report Hydrogeologic Site Investigation, February 26, 1987.
8. TWC, Solid Waste Compliance Monitoring Inspection Report, by John Perrin, February 24, 1987.
9. Texas Water Commission, Notice of Registration, Industrial Solid Waste Generation/Disposal, September 16, 1986.
10. Groundwater Quality Investigation Plan, June 23, 1986.

X. REFERENCES (Cont'd.)


11. Letter to John Perrin, Dixie Chemical Company, from Kelly L. Maloy, TDWR, Re: Industrial Solid Waste Registration, Notes Closure Certification Approval by TDWR, April 11, 1986.

12. TWC, Comprehensive Groundwater Monitoring Evaluation (CME) Report, March 25, 1986.

13. Amended Closure Plan for Dixie Chemical Company, Inc., January 15, 1986.

14. Closure Certification for Hazardous Waste Facilities, Dixie Chemical Companies, November 7, 1985.

15. Letter to Dick Martin, TWC, from John Perrin, Dixie Chemical Company, Re: Sludge Classification and Characterization, September 18, 1985.

16. Letter to John Perrin, Dixie Chemical Company, from Charles Nemir, TDWR, Re: Approval of Amended Closure Plan, May 2, 1985.

17. Report on Closure Activities, July 24, 1985.

18. Interoffice Memorandum to Bryan Dixon, TDWR, from Stennie Meadurs, Field Rep., TDWR, Re: RCRA Enforcement/Compliance Status, January 24, 1985.

19. Closure Plan for Dixie Chemical Company, September 10, 1984.

20. Letter to Chip Volz, TDWR, from Clark Hickman, S&B Engineers, Inc., Re: Dixie Chemical Company's Bayport Plant Closure Plan, August 23, 1984.

21. Interoffice Memorandum from Bryan Dixon, TDWR, to Gail Corrigan, Field Representative, Re: Addendum to Enforcement Action, May 1, 1984.

22. Letter to Charles Nemir, TDWR, from John Perrin, Dixie Chemical Company, Inc., Re: Partial Closure Plans, March 29, 1984.

23. Letter from Robin Morse, Attorney for Dixie Chemical Company, to Mr. Merton Coloton of TDWR, February 29, 1984.

24. Analytical test results for Aeration Basin, November 9, 1983.

25. Document titled: Investigation Report, Dixie Chemical Company.

26. Compliance Monitoring Inspection Report, Comments Sheet, August 30 and November 30, 1983.

27. Part A Permit Application (TWC), August 17, 1980.

28. Part A, EPA, November 18, 1980.

29. Technical Report, Comprehensive Groundwater Monitoring Evaluation.

30. TWC, Solid Waste Inspection Report, Groundwater Monitoring Checklist.

**Reference 5**

Dixie Chemical Company

Bayport Facility

ISW Registration No. 30314

# CLOSURE GROUNDWATER MONITORING

Sampling Plan
Attachment B-1

B. Sampling Procedures

1. a. Is a Sampling Plan [31 TAC 335.193(a)] maintained at the facility? Include a copy as Attachment B-1.
   Yes ✓ No ___

   b. Does the plan address the following items:
   (1) Sample collection procedures Yes ✓ No ___
   (2) Sample preservation and shipment Yes ✓ No ___
   (3) Analytical procedures Yes ✓ No ___
   (4) Chain of custody procedures Yes ✓ No ___

   c. List deficiencies/omissions/recommemded changes:
   Sample Preservation + Shipment: applicable samples are not acidified in the field. All samples are preserved by ice. Shipment of samples could be expounded up. Chain of Custody procedures could be discussed in further detail.

   d. Does the facility follow the plan during sampling events?
   Yes ___ No ✓
   If not, describe differences between the plan and actual sampling procedures: All samples are preserved by ice; applicable samp are not acidified in the field (the maximum holding times noted in the Sampling Pla include acidification where noted). Section X, Field Measurements; temperature was not measured during the inspection.

2. Are wells equipped with caps Y/~~N~~ MCL, annulus seals Y/~~N~~ MCL to prevent contamination from surface sources? Are the well caps lockable? Y/~~N~~ MCL

3. Describe how and when measurements of water level and well total depth are made: The water level measurement is the initial measureme each well; the procedure is: 1) remove lock from cap of steel protective casing; 2) rinse water level indicator probe w/deionized water, 3) deionized water container is a 3 gallon spray tank; 4) measurement from northernmost orientation, 5) measure to the nearest 0.01 foot, 6) subtract water level from elevation of top of casing (TOC) w/ respect to mean sea level 7) measure total depth, 8) record data on Static Water Level + and 9) rinse water level indicator probe w/deionized water

4. a. Describe well evacuation equipment and techniques: A 1.7" Hand Pump manufactured by Brainard + Kilman was used to purge the monitor w (Attachment B-2) The Hand Pump is based on the principle of reverse flow check valves. A minimum of 4 well volumes was purged. The effluent was purged into a 10 plastic bucket.

b. Are appropriate collection and disposal methods used for bailed water? Y/N Describe: The effluent was purged into a 10 gallon bucket; MW-1 effluent was disposed of in the laboratory on-site + MW 2+3 effluent was disposed of into the waste disposal sump

c. If the same equipment is used to evacuate each well, describe decontamination procedures: The Hand Pump was used to p MW1+2+3; the pump pieces were triple rinsed w/ deionized water + wiped dow w/ paper towels

5. a. Describe the sampling equipment and methodology used to collect samples: 1) Water levels taken; 2) wells purged a minimum of 4 well volum 3) a stainless steel bailer was used on MW-1 + MW-2; MW-3 was bailed w/a dedicated PVC bailer labeled MW-3. It was an error on S+B's part to use the stainless bailer for MW-2, which has its own PVC bailer. 4) Disposable nylon twine was used each bailer per well 5) The bailer was triple-rinsed w/ deionized water before + aft the sampling of each well + dried w/ paper towels

b. If the same equipment is used to evacuate each well, describe decontamination procedures: The Hand Pump was used to pu MW 1+2+3; it was triple rinsed w/ deionized water inside + outside. The stainless bailer was used for sampling MW-1 + MW-2; it was triple rinsed w/ deionized w. inside + outside as was the PVC bailer that was used for MW-3.

c. Indicate the order in which samples are taken:
1st VOA ; 2nd TOC ; 3rd GC/MS ;
4th cation-anion ; 5th heavy metals

6. Indicate parameters determined in the field/ on-site lab; within 15 min. ~~hr.~~ of taking sample:

(Note type of instruments used.)

Temperature not taken by S+B (internal temperature calibration in S-C-T Met

pH VWR Scientific Inc, Mini Digital pH Meter; no model number found.

Sp. Conductance S-C-T Meter; Yellow Springs Instrument Co.; Model 33

Other Water Level Indicator: Solinst, Burlington Ontario Model: L7P 1A5

7. a. Describe techniques for field filtration of samples: not filtered in field

b. Parameters filtered: NA

8. Complete the following table for the facility's sampling program:

| Container | Preservative | Parameters | S/U |
|---|---|---|---|
| VOA glass vial w/ teflon seal | ice | VOA + acetonitrile acrylonitrile epichlorohydrin | S |
| plastic cubitainer (1L) | ice | TOC, TSS, VSS | S* |
| plastic cubitainer (1L) | ice | heavy metals | S |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

S = Satisfactory U = Unsatisfactory

Comments: The TOC sample was not preserved in the field nor did S+B used a pre-preserved container. Maximum holding time for TOC is 24 hrs if cooled to 4°C + acidified to a pH of 2.

9. Is the observed sampling methodology adequate for :

a. Indicator parameters N/A ___ Yes ✓ No ___

b. Quality parameters N/A ✓ Yes ___ No ___

c. Drinking water parameters N/A ✓ Yes ___ No ___

d. Metals N/A ___ Yes ✓ No ___

e. Volatile organics (✓); Floating immiscible organics ( ); Dense immiscible organics ( ) [check if applicable] : N/A ___ Yes ✓ No ___

f. Describe possible problems: ___

10. Describe any Quality Assurance/Quality Control (QA/QC) procedures used in the facility's sampling program: The initial fie blank is taken after the bailer is triple rinsed w/ deionized water; on the fou rinse, the deionized water is saved for the field blank. After sampling approx 10% of the monitor wells, another field blank is taken or at the end o the sampling.

11. a. Describe Chain of Custody (C.O.C.) and shipping procedures: The samples collected at Dixie Chemical Company were collected + delivered to the S+B Lab the same day. Each sample cont is prelabeled + noted on the C.O.C. form. The S+B samplers collected delivered the samples thus minimizing transfers of possession.

    b. Attachment B-3: Example of C.O.C. tag or Example of sample identification tag or label.
    Attachment B-4: Sample Label

12. Do the C.O.C. and shipping procedures minimize the possibility of tampering with the samples? Yes ✓ No ___

    If not, describe possible problems: ___

13. Complete the following items if monitor wells are co-sampled with the facility operator.

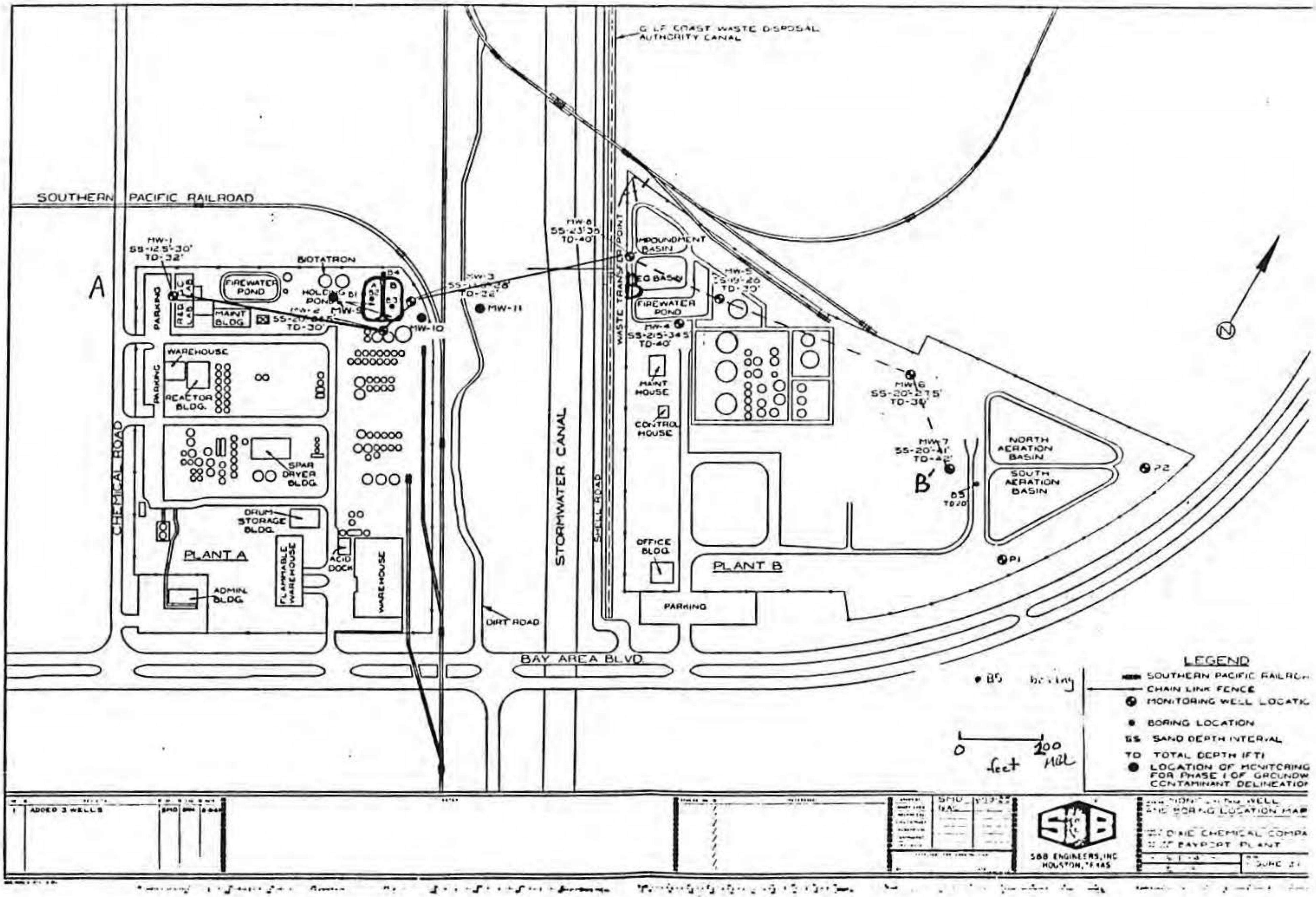
    a. Person(s) who collected samples for:
    Facility Gail Corrigan + Grant Cox S+B Engineers
    TWC Marilyn Czimer Long + Ann C. Dobbs (TWC - District 7)

    b. Number of wells co-sampled: 3 of 8 total RCRA wells.

    c. Attachment B-5 - TWC Sample Schedule

    d. Attachment B-6 - TWC Field Notes

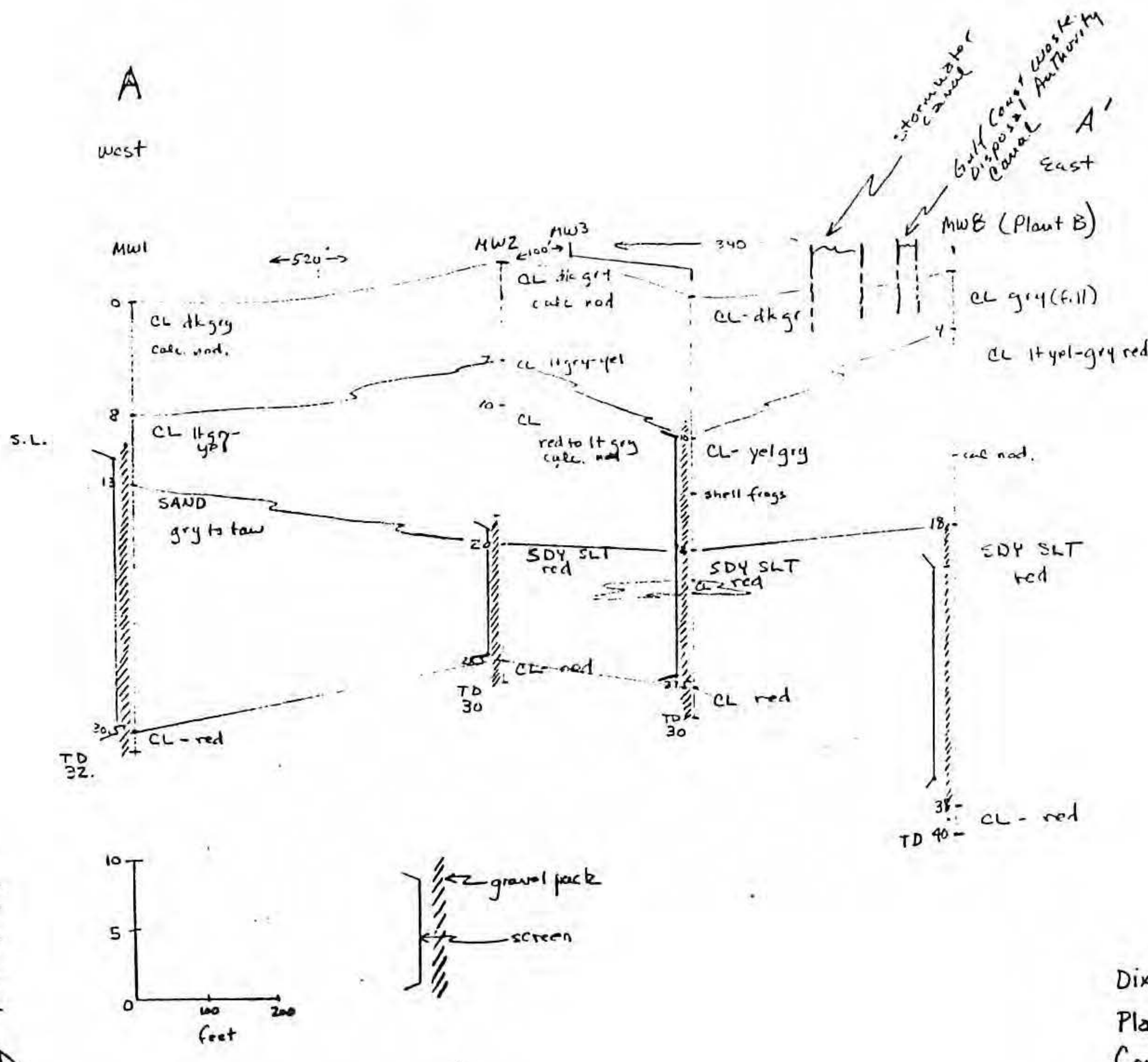
    e. Comments: ___




Closed facility
Certification received

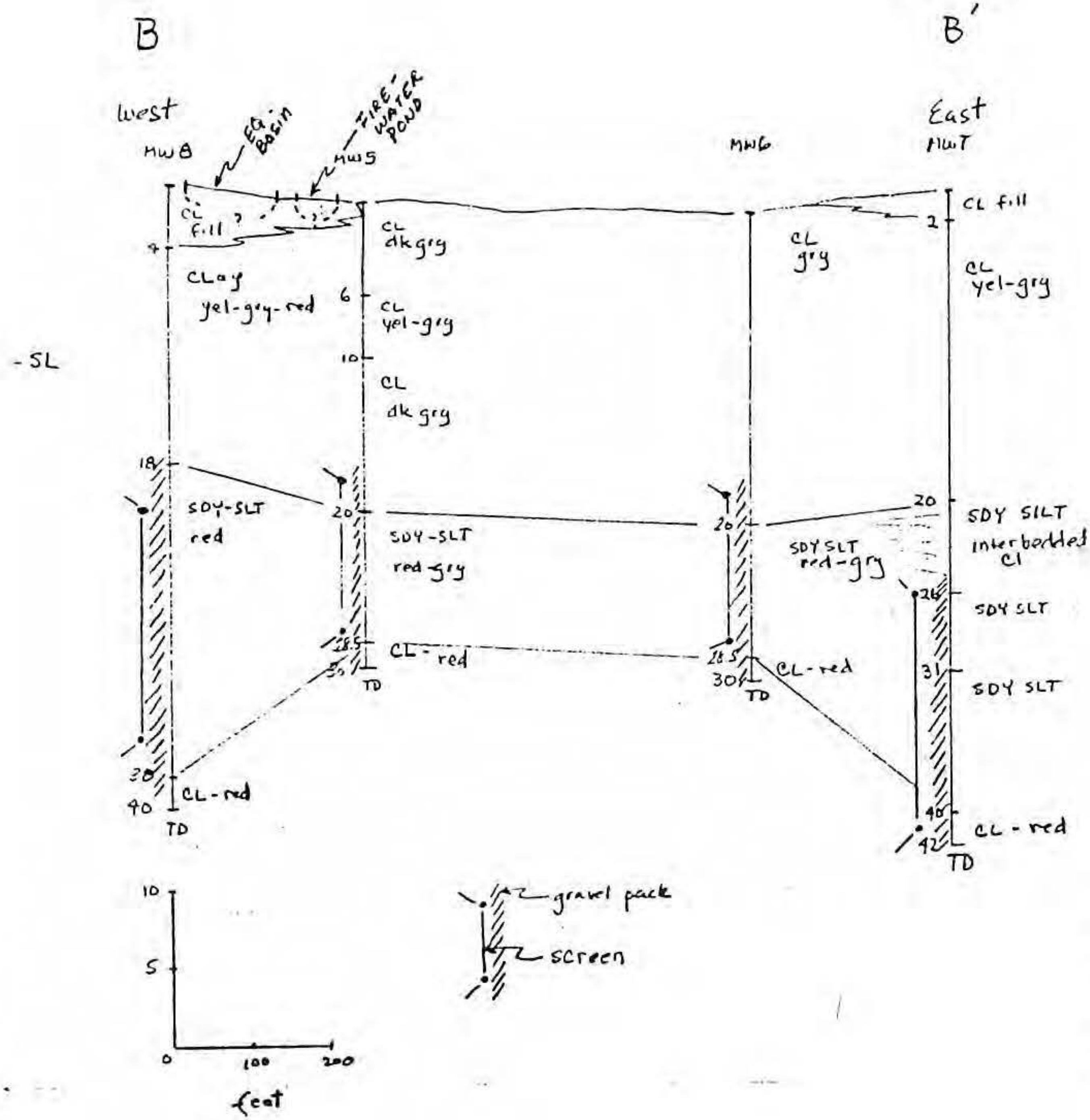
A B Waste Management Area
closure in progress – Ponds A + B

Dixie Chemical Company
Site Diagram




Dixie Chemical Company
Plant A
Cross Section A - A'

Attachment A-2




Dixie Chemical Company

Plant B

Cross Section B-B'

Attachment

Attachment A-3

# LOG & AS-BUILT DIAGRAM

FIGURE 3.2

## GEOLOGIC LOG

**DRILLER:** YOUNGER DRILLING CO.
**COMPLETION DATE:** 4/29/85
**ALTITUDE:** 9.86 FT. MSL (approx)

**GROUND SURFACE**

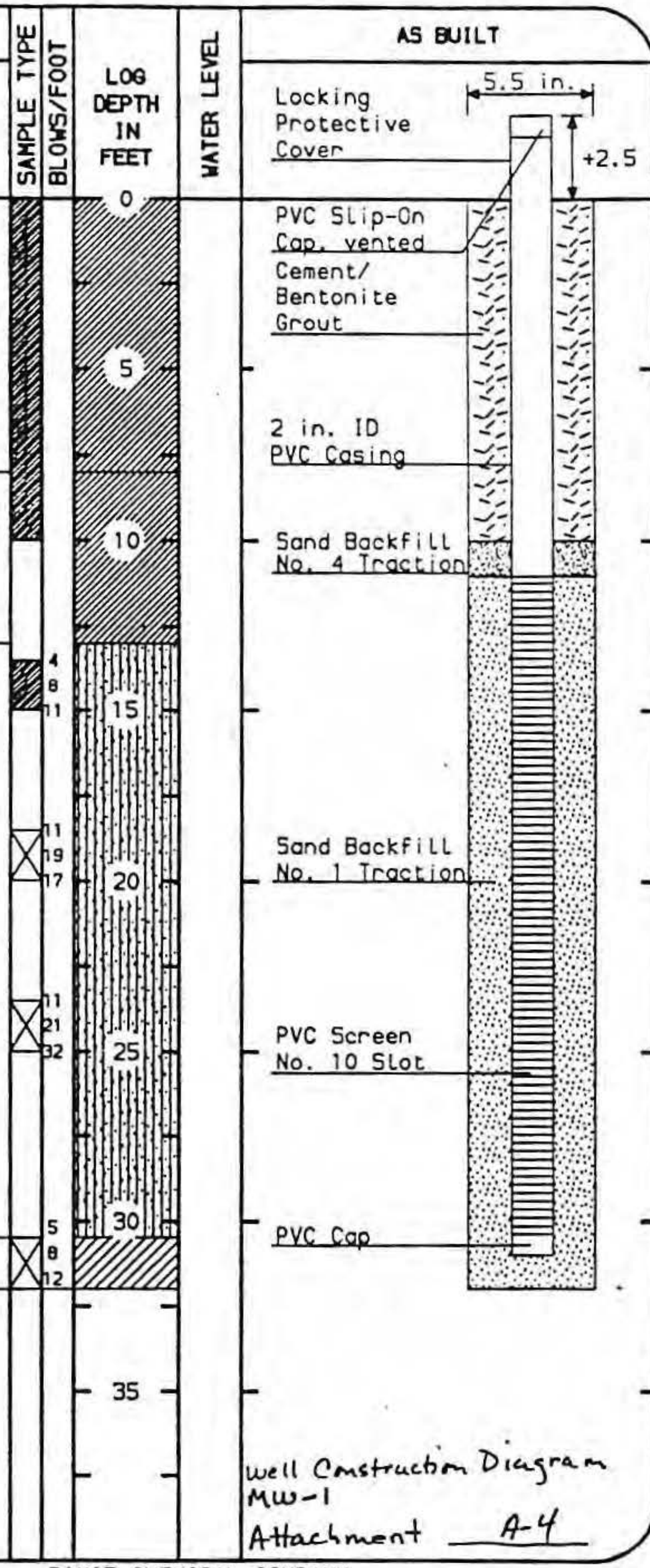
Dark grey CLAY (CH)
- ferrous oxide veining
- calcareous nodules
- bioturbated

Light grey - yellow CLAY (CH)
- mottled
- ferrous oxide veining

Grey - tan SAND (SM)
- ferrous nodules

Red CLAY (CL)

Total Depth 32 ft.




Well Construction Diagram
MW-1
Attachment A-4

S & B ENGINEERS, INC.
HOUSTON, TEXAS

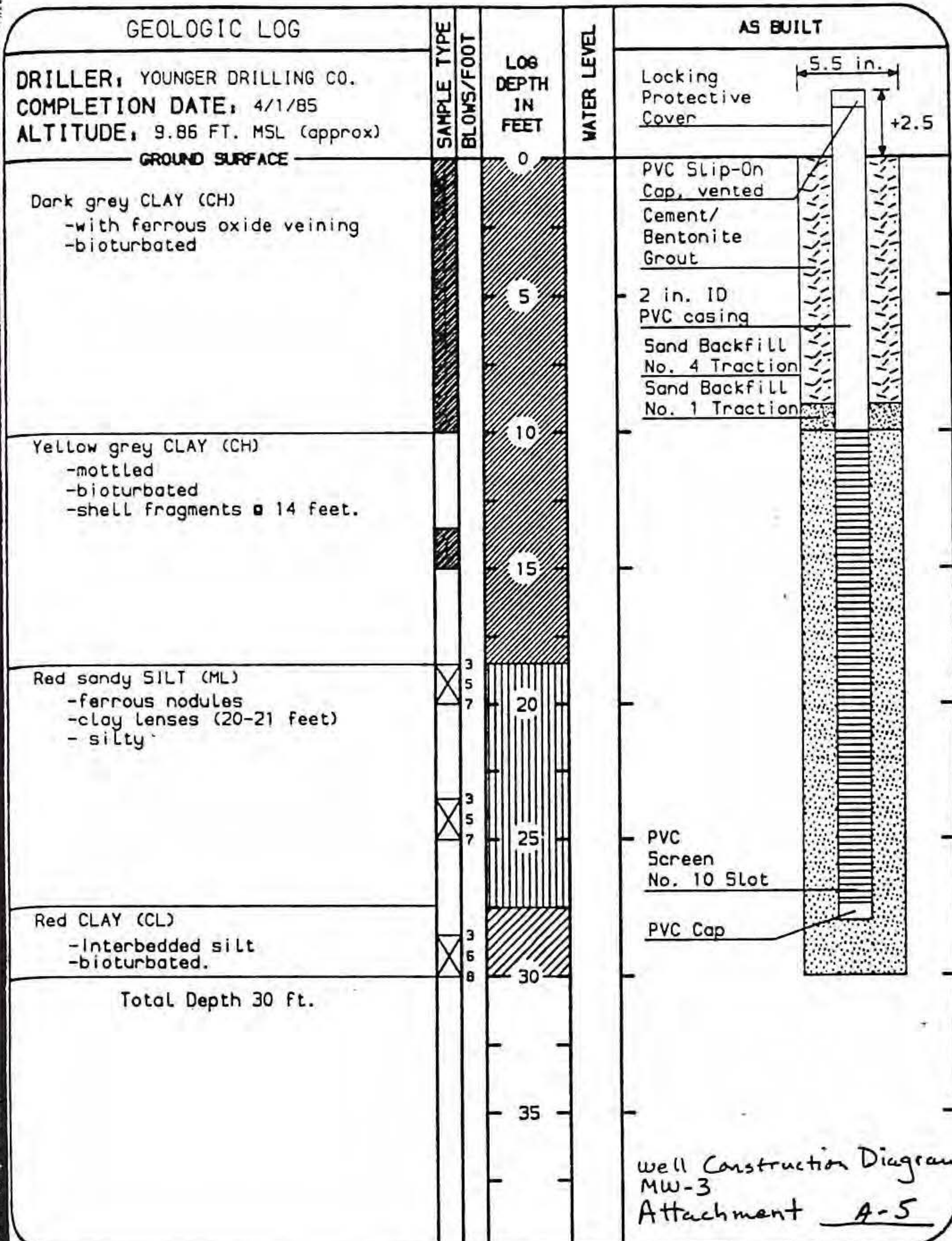
DIXIE CHEMICAL COMPANY
PASADENA, TEXAS

GROUNDWATER MONITORING WELL
MW1

E-4586
MARCH, 1985

# LOG & AS-BUILT DIAGRAM

# FIGURE 3.4




S & B ENGINEERS, INC.
HOUSTON, TEXAS

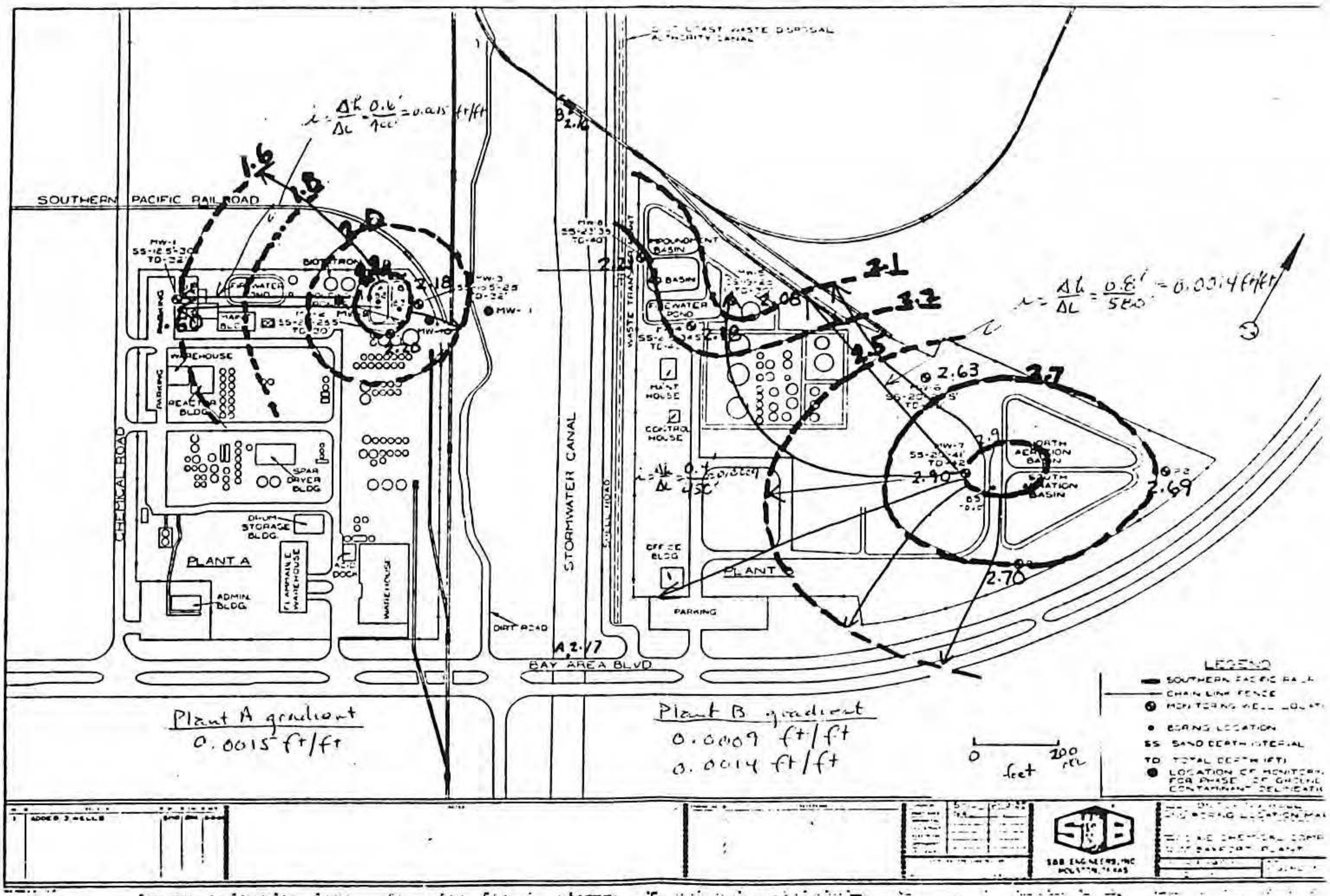
DIXIE CHEMICAL COMPANY
PASADENA, TEXAS

GROUNDWATER MONITORING WELL
MW3

E-4586
MARCH, 1985

Attachment A-6. Table of Well Construction Details

| Well Number | MW 1 | MW 2 | MW 3 | MW 4 | MW 5 | MW 6 | MW 7 | MW 8 |
|---|---|---|---|---|---|---|---|---|
| Hole diameter | 6.0" | | | | | | | |
| Total depth | 32' | 30' | 30' | 40' | 30' | 30' | 42' | 40' |
| Drill method | Rotary* (see comments) | | | | | | | |
| Date drilled | 4-29-85 | 4-2-85 | 4-1-85 | 3-7-85 | 3-28-85 | 3-28-85 | 5-15-85 | 4-15-85 |
| Casing I.D. | 2" | | | | | | | |
| Casing type | sch. 40 PVC | | | | | | | |
| How joined | threaded flush joint | | | | | | | |
| Stick-up length | 2.5' | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 |
| T.O.C.-MSL | 12.36 | 14.74 | 12.36 | 13.0 | 12.5 | 11.5 | 13.0 | 13.7 |
| Ground level-MSL | 9.86' | 12.24' | 9.86' | 10.5' | 10.0' | 9.0' | 10.5' | 11.2' |
| Capped/Lockable | Yes | | | | | | | |
| Surface pad size | 18" diameter | | | | | | | |
| Depth of surface seal | surface pad depth between 1.0'-1.5' | | | | | | | |
| Annulus Fill | Cement/ Bentonite Grout | | | | | | | |
| Depth-annulus seal | 10' | 18' | 8' | 21' | 17' | 17' | 25' | 18' |
| Depth-gravel pack | 10-11 #4 sd<br>11 #1 sd | 18-19 #4 sd<br>19 #1 sd | 9-10 #4 sd<br>10 #1 sd | 21-25 #4 sd<br>25 #1 sd | 17-18 #4 sd<br>18 #1 sd | 17-18 #4 sd<br>18 #1 sd | 25-26 #4 sd<br>26 #1 sd | 18-21 #4 sd<br>21 #1 sd |
| Length-gravel pack | 11-32<br>31' | 19-30<br>11' | 10-30<br>20' | 25-40<br>15' | 18-30<br>12' | 18-30<br>12' | 26-42<br>16 | 21-38.5<br>17.5 |
| Size-gravel pack | No.1 fraction sd | | | | | | | |
| Depth to screen | 11 | 19' | 10' | 25' | 10' | 10' | 21' | 21 |



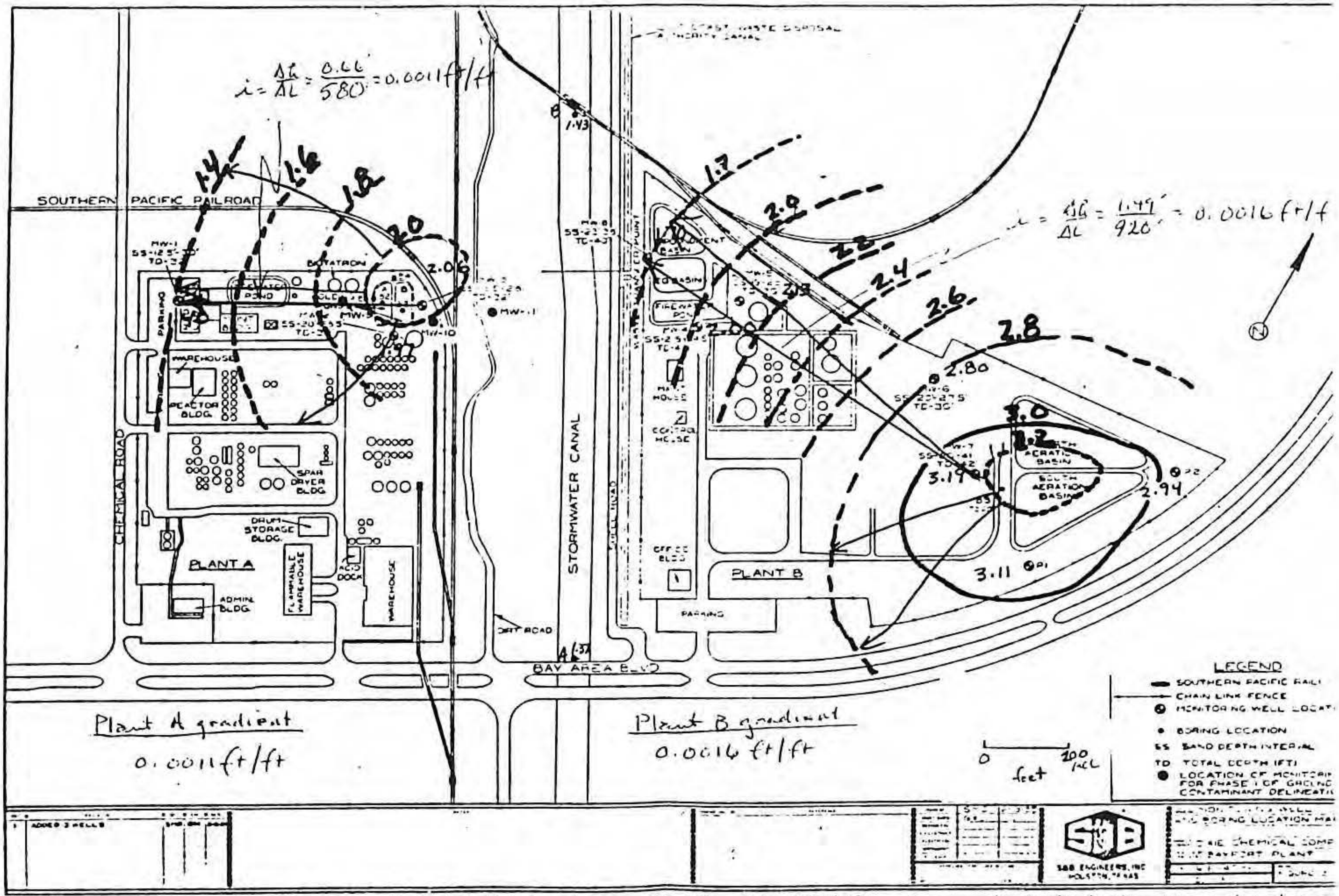

Ditch Point A 2.17
Ditch Point B 2.16

← ground water flow path

Closed facility

← gradient

Flow Direction, Gradients & Static Water Level Elevation (MSL)
Sampling date 5-29-85




Ditch Point A 1.37

Ditch Point B 1.43

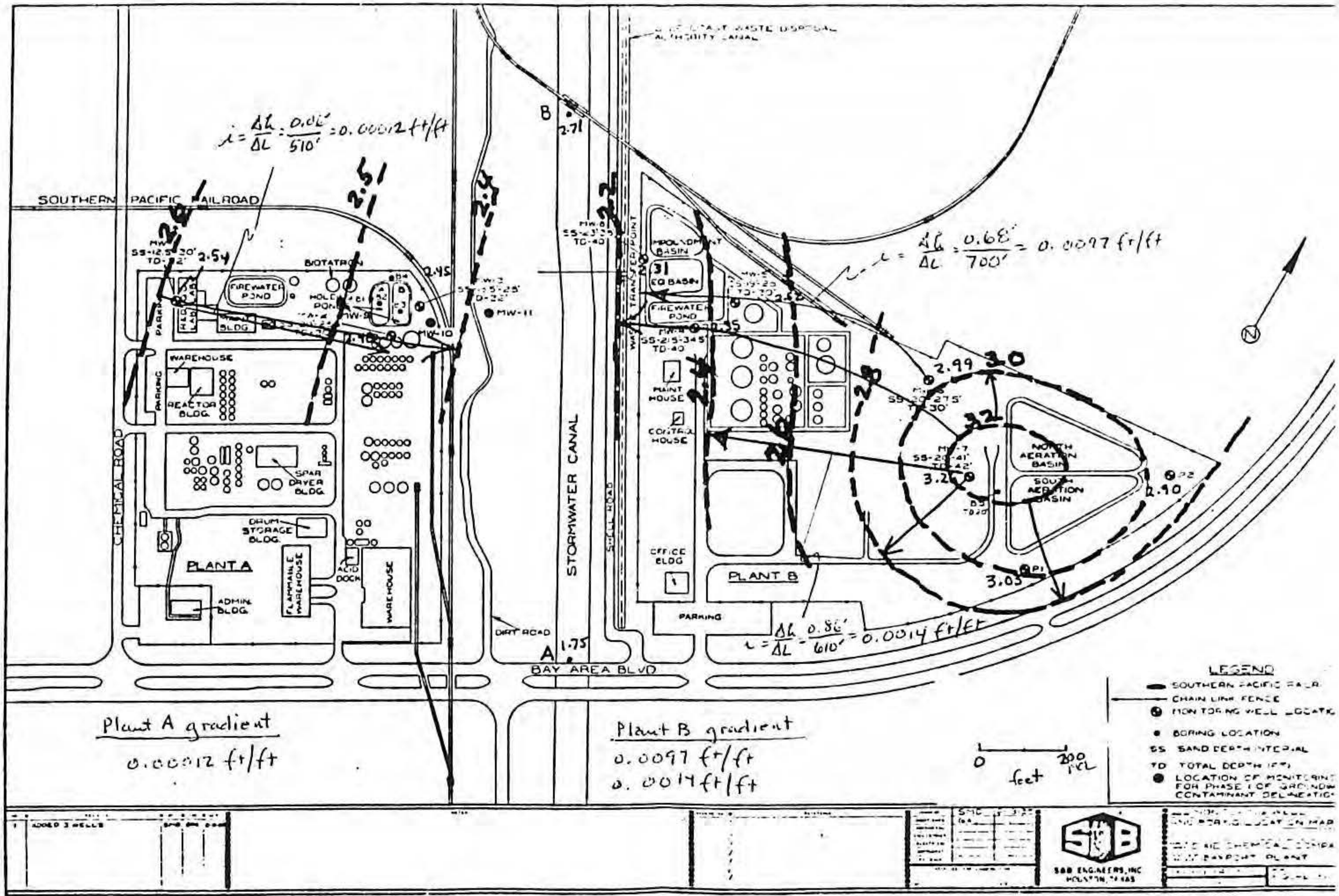
← ground water flow path

Flow Directions Gradients and Static Water Level Elevation (MSL)

Sampling Date 7-3-85

– closed facility

Attachment A-8




Ditch Point A 1.75

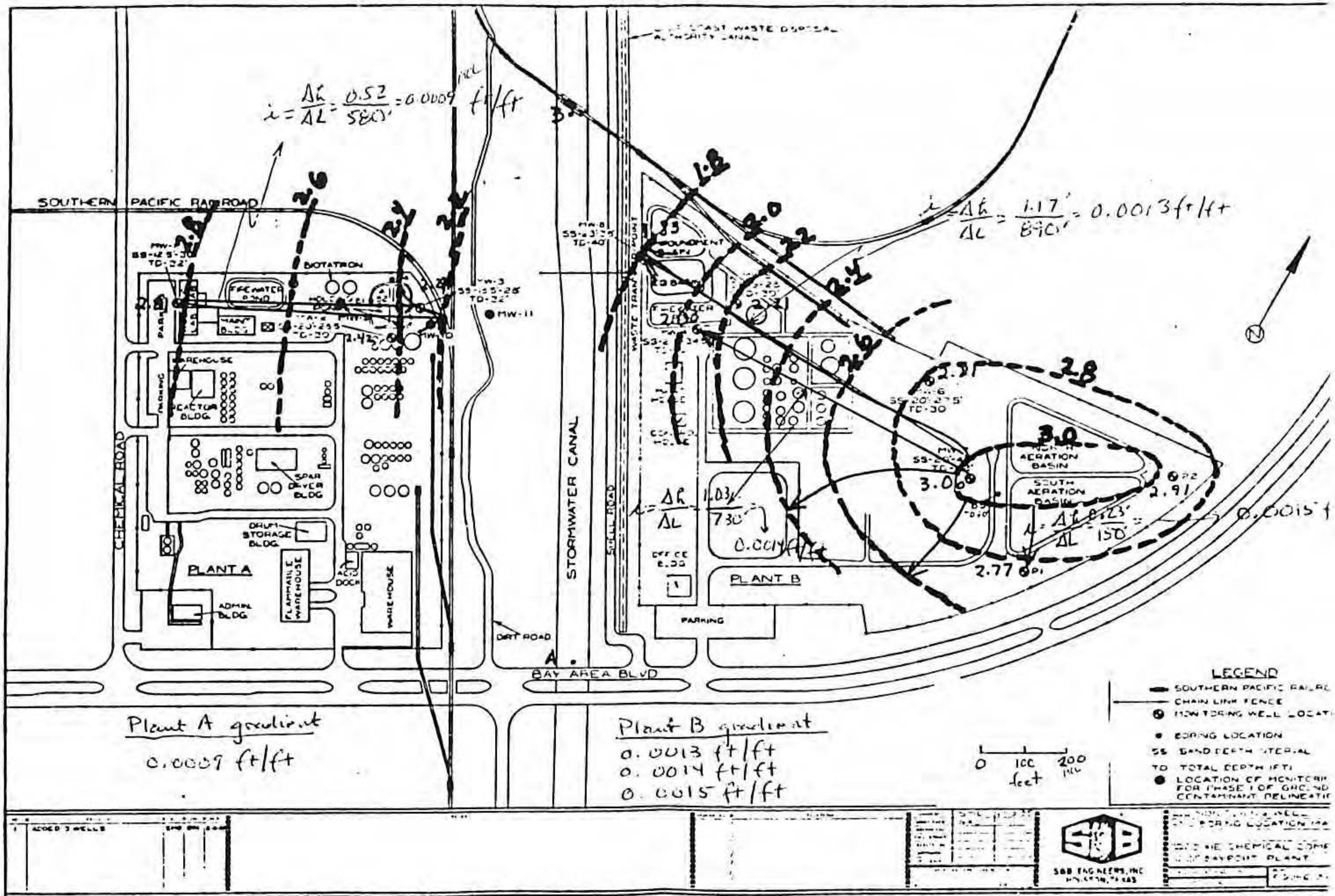
Ditch Point B 2.71

← ground water flow path

← gradient

Flow Directions + Gradients + Static Water Level Elevation (MSL)

Sampling Date 12-17-85




Ditch Point A — not taken
Ditch Point B — not taken

← ground water flow path

Flow Directions, Gradients and Static Water Level Elevation (MSL)

Sampling Date 3-24-86

## Average Linear Velocity

$$\bar{v} = \frac{K\,i}{\theta}$$

set $K = 1.0 \times 10^{-3}$ cm/sec. (assumed value for silt)

$i = 0.00012$ ft/ft + 0.0015 ft (range of Plant A gradients)

$\theta = .25$ (assumed)

for gradient = 0.00012 ft/ft

$$\bar{v} = \frac{(1 \times 10^{-3})(0.00012)}{.25} = \boxed{.49 \text{ ft/yr}}$$

for gradient = 0.0015 ft/ft

$$\bar{v} = \frac{(1 \times 10^{-3})(0.0015)}{.25} = \boxed{6.2 \text{ ft/yr.}}$$

**TEXAS WATER COMMISSION**
District No.

Dixie Chemical Company
Average Linear Velocity

Attachment A-11

B

TABLE 3.3

SPECIFIC CAPACITY TEST RESULTS

| Monitoring Well Number | Specific Capacity* (gpm/ft) | Monitoring Well Depth (ft) | Screen Length (ft) |
|---|---|---|---|
| MW-1 | 7.6 | 32 | 20 |
| MW-2 | 2.7 | 30 | 10 |
| MW-3 | 5.0 | 30 | 5 |
| MW-4 | 3.6 | 40 | 10 |
| MW-5 | 5.0 | 30 | 10 |
| MW-6 | 6.3 | 30 | 10 |
| MW-7 | 4.8 | 42 | 15 |
| MW-8 | 6.1 | 40 | 15 |

* Specific capacities were calculated as the ratio of pump flow rate to the water level drawdown occurring after five minutes of continuous pumping.

4

5

Dixie Chemical Co.

Attachment A-12

CONTINUATION SHEET

# Monitor Well Designations

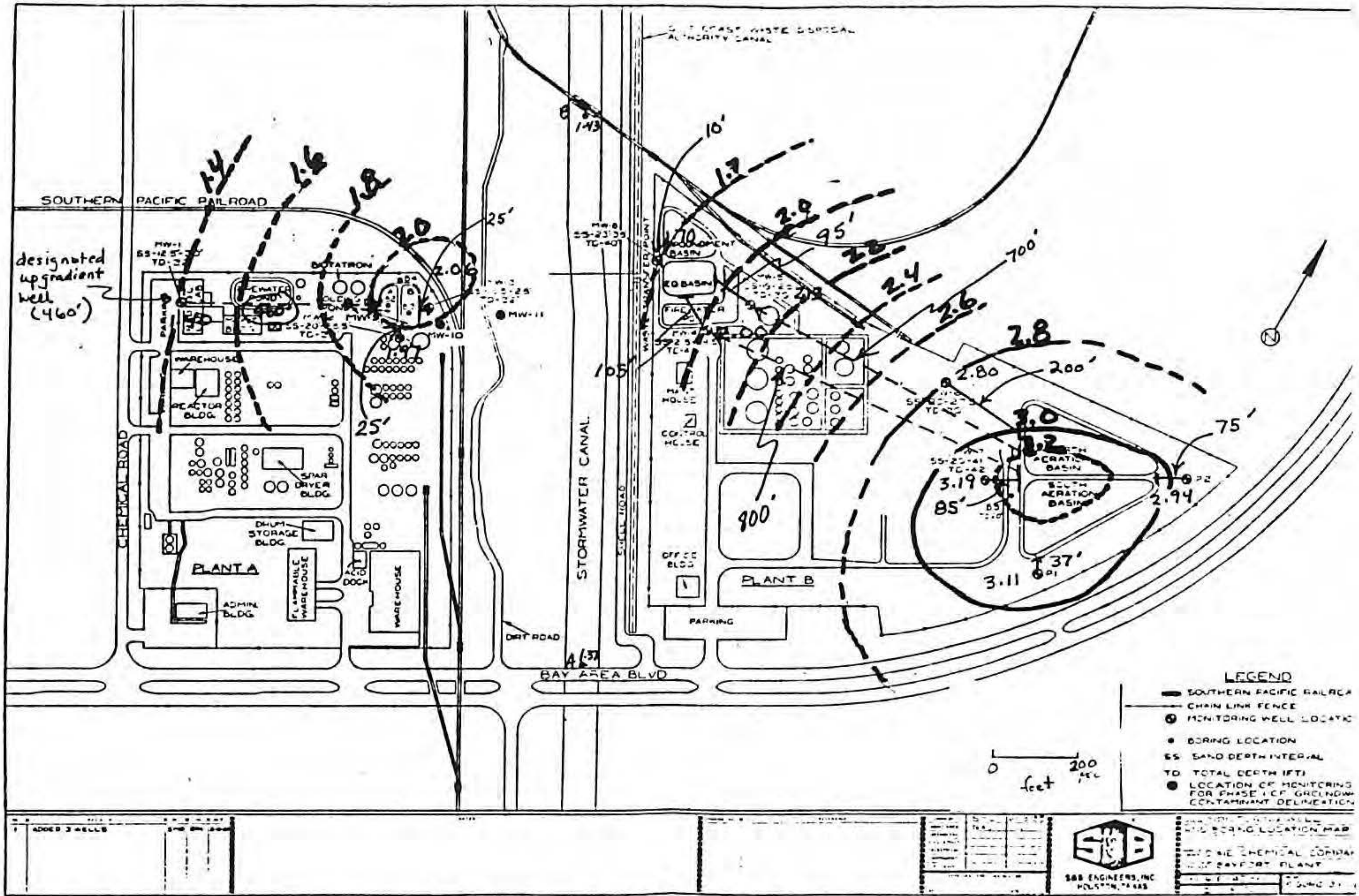
## PLANT A

| Monitor Well Number | INSTALLED AS: | Present Designation |
|---|---|---|
| MW-1 | Upgradient | upgradient for sampling { 12-17-85, 3-24-86 }; downgradient for sampling { 5-29-85, 7-3-85 } |
| * MW-2 | Downgradient | mounding present { 5-29-85, 7-3-85 }; downgradient " " { 12-17-85, 3-24-86 } |
| * MW-3 | Downgradient | mounding present { 5-29-85, 7-3-85 }; downgradient " " { 12-17-85, 3-24-86 } |

## PLANT B

| Monitor Well Number | INSTALLED AS: | Present Designation |
|---|---|---|
| MW-4 | Downgradient | upgradient to { Impoundment basin, EQ basin }; downgradient to { North + South Aeration Basins } |
| MW-5 | Downgradient | { as above ↑ |
| MW-6 | Upgradient | upgradient to: { impoundment basin, EQ basin }; downgradient to { North + South Aeration Basins } |
| MW-7 | Downgradient | { influenced by apparent mounding eff of North + South Aeration Basins |
| MW-8 | Upgradient | downgradient |
| P-1 (piezometer) | | { influenced by apparent mounding e of North + South Aeration Basins |
| P-2 (piezometer) | | |

Attachment A-13

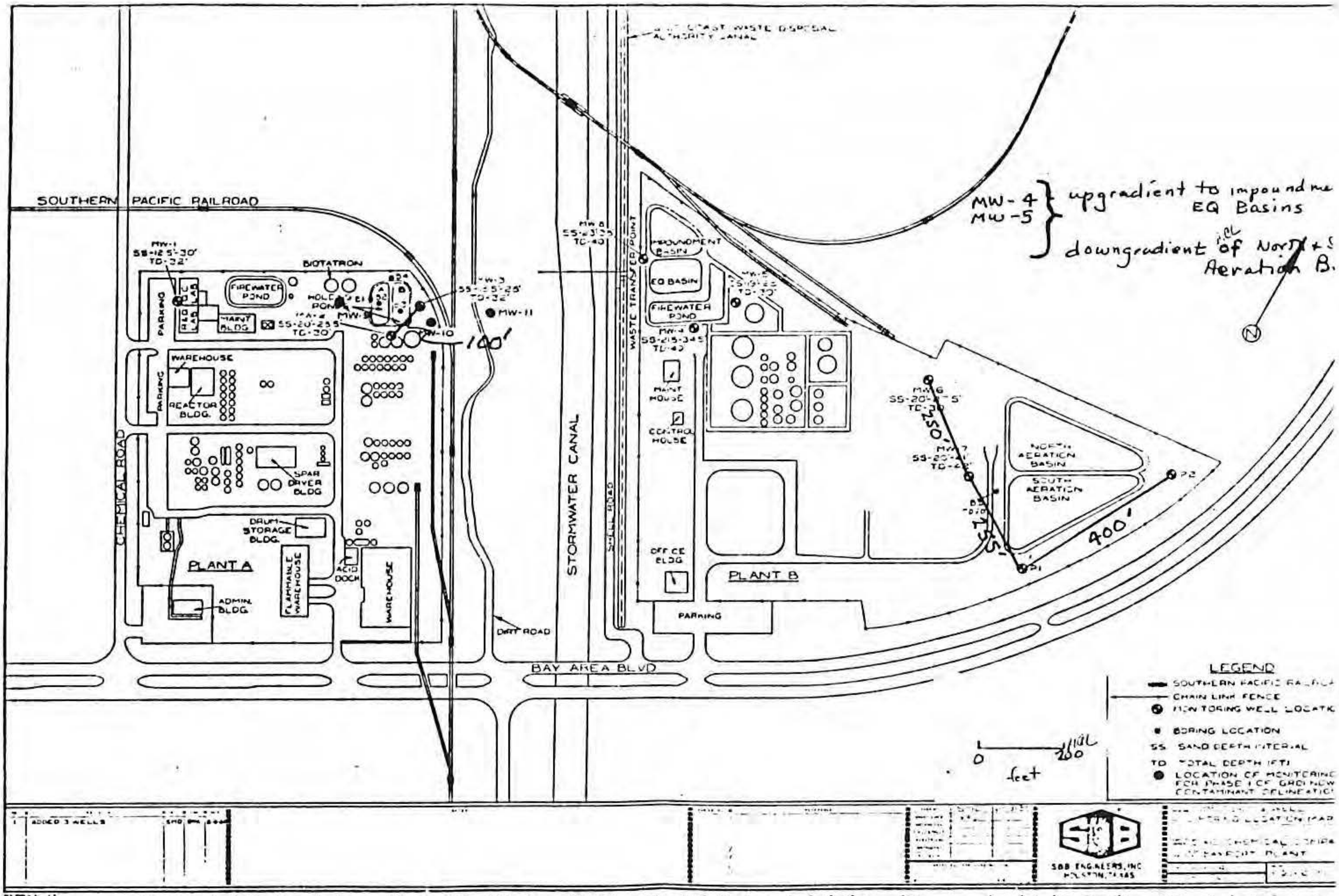



Designated Upgradient & Downgradient Wells; Distances
Static Water Level Elevation (MSL)
Sampling Date 7-3-85

Ditch Point A 1.37

Ditch Point B 1.43

* = closed facility




Dixie Chemical Company
Lateral Spacing of Monitor Wells

# LOG & AS-BUILT DIAGRAM

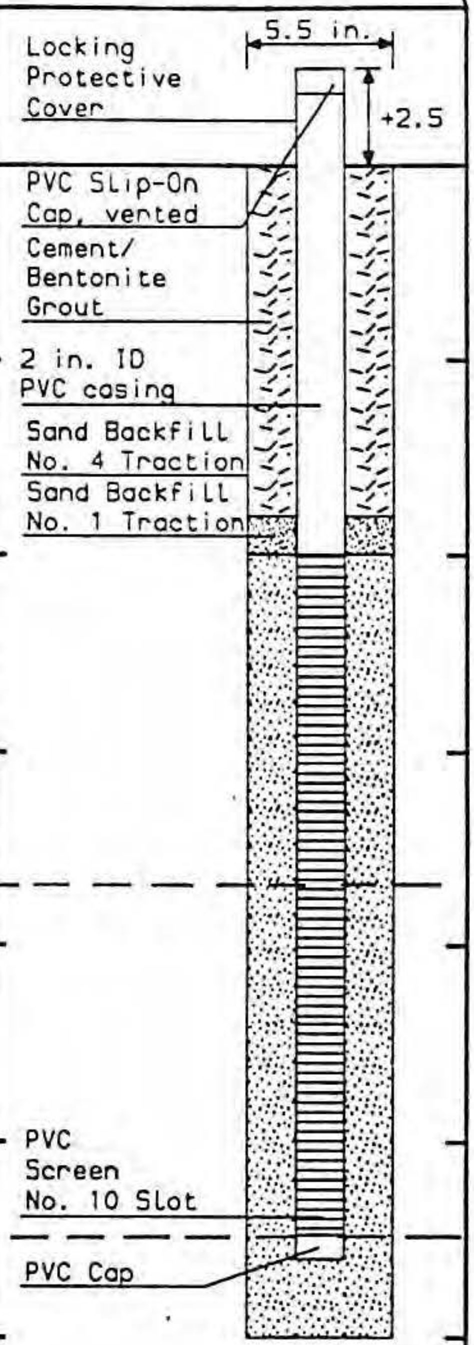
# FIGURE 3.4

## GEOLOGIC LOG

**DRILLER:** YOUNGER DRILLING CO.
**COMPLETION DATE:** 4/1/85
**ALTITUDE:** 9.86 FT. MSL (approx)

| Geologic log | Sample type | Blows/foot | Log depth in feet |
|---|---|---|---|
| GROUND SURFACE | | | 0 |
| Dark grey CLAY (CH)<br>-with ferrous oxide veining<br>-bioturbated | | | 0–10 |
| Yellow grey CLAY (CH)<br>-mottled<br>-bioturbated<br>-shell fragments @ 14 feet. | | | 10–18 |
| Red sandy SILT (ML)<br>-ferrous nodules<br>-clay lenses (20-21 feet)<br>- silty | | 3<br>5<br>7<br><br>3<br>5<br>7 | 18–27 |
| Red CLAY (CL)<br>-interbedded silt<br>-bioturbated. | | 3<br>6<br>8 | 27–30 |
| Total Depth 30 ft. | | | |

## AS BUILT




Attachment A-1b

S & B ENGINEERS, INC.
HOUSTON, TEXAS

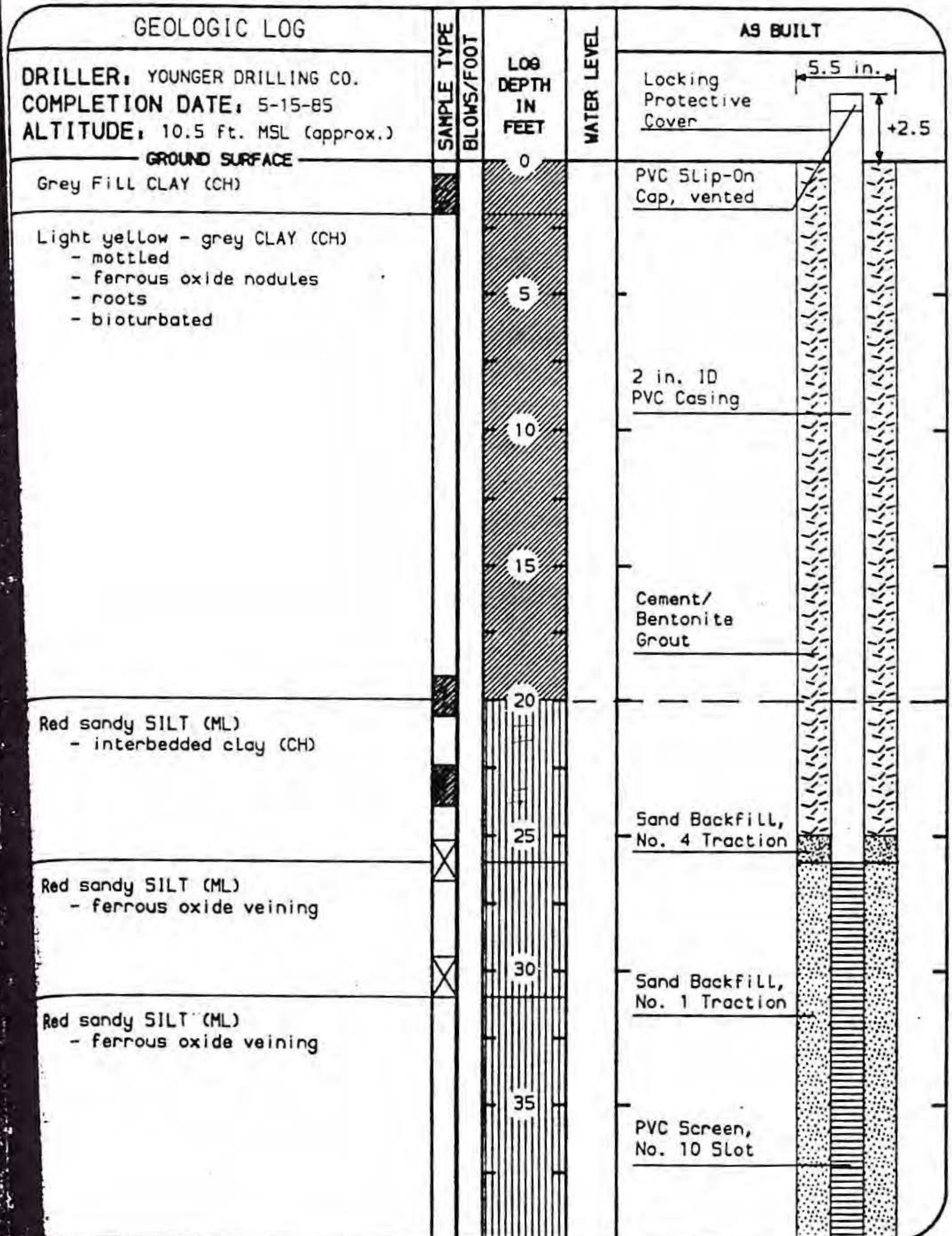
DIXIE CHEMICAL COMPANY
PASADENA, TEXAS

GROUNDWATER MONITORING WELL
MW3

E-4586
MARCH, 1985

# LOG & AS-BUILT DIAGRAM

FIGURE




S & B ENGINEERS, INC.
HOUSTON, TEXAS

DIXIE CHEMICAL COMPANY
PASADENA, TEXAS

GROUNDWATER MONITORING WELL
MW7

E-4586
MARCH, 1985

Attachment A-17

# LOG & AS-BUILT DIAGRAM

FIGURE

| GEOLOGIC LOG | SAMPLE TYPE | BLOWS/FOOT | LOG DEPTH IN FEET | WATER LEVEL | AS BUILT |
|---|---|---|---|---|---|
| **DRILLER:** YOUNGER DRILLING CO.<br>**COMPLETION DATE:** 5-15-85<br>**ALTITUDE:** 10.5 ft. MSL (approx.) | | | | | 5.5 in. |
| Red CLAY (CL) | | | 40 | | PVC Cap |
| Total Depth 42 ft. | | | 45 | | |

S & B
ENGINEERS, INC.
HOUSTON, TEXAS

DIXIE CHEMICAL COMPANY
PASADENA, TEXAS

GROUNDWATER MONITORING WELL
mw7

E-4586
MARCH, 1985

Attachment

# LOG & AS-BUILT DIAGRAM

# FIGURE 3.8

## GEOLOGIC LOG

**DRILLER:** YOUNGER DRILLING CO.
**COMPLETION DATE:** F/15/85
**ALTITUDE:** 11.2 ft. MSL (approx)

**GROUND SURFACE**

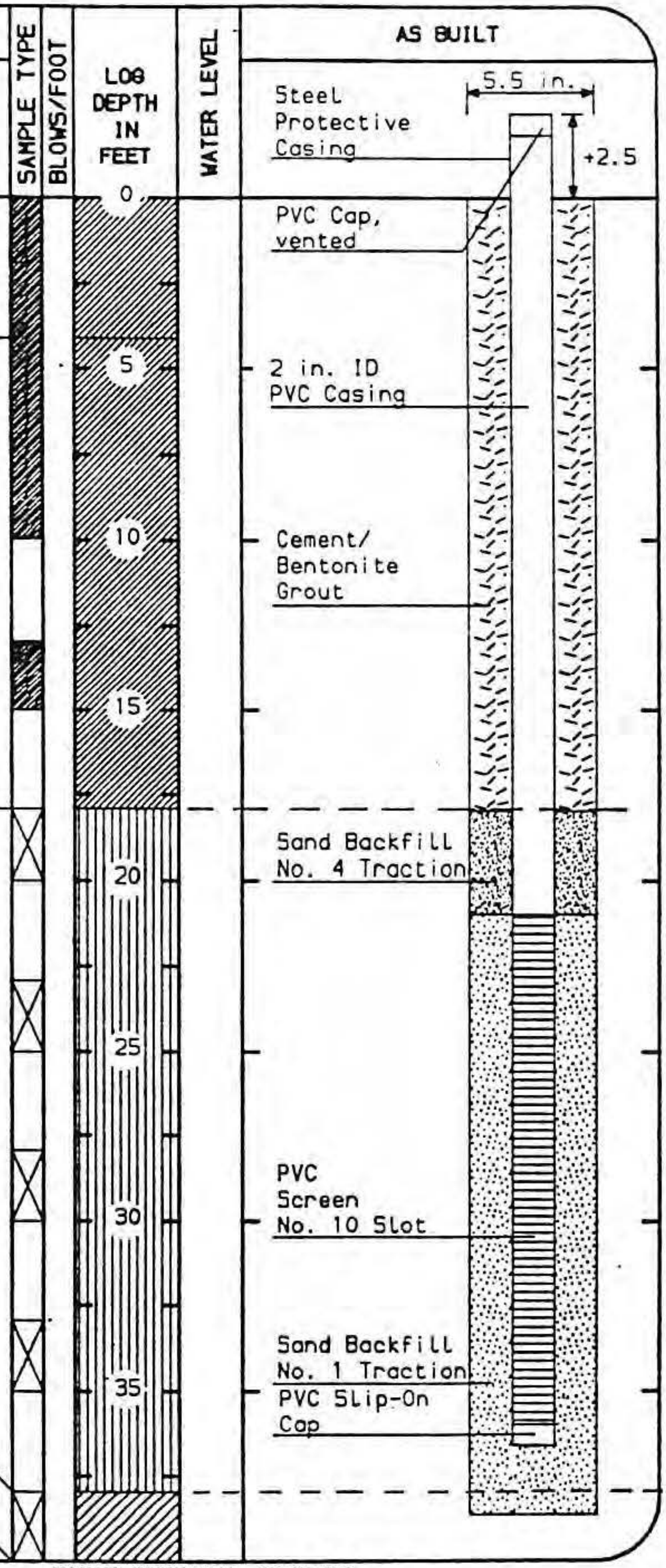
Grey CLAY (CH) Fill

Light yellow - grey-red CLAY (CH)
- -mottled
- -ferrous oxide veining
- -ferrous oxide nodules
- -calcareous nodules at 13⁵ ft.
- -bioturbated

Red sandy SILT (ML)
- -interbedded CLAY (CH)
- -bioturbated
- -ferrous oxide nodules

Red CLAY (CL)

Total Depth 40 ft.




S & B ENGINEERS, INC.
HOUSTON, TEXAS

DIXIE CHEMICAL COMPANY
PASADENA, TEXAS

GROUNDWATER MONITORING WELL
MW8

E-4586
MARCH, 1985

Attachment A-18

1. Vertical placement- Indicate on cross-sections (Att A-2 A-3, above) the screened and gravel-packed intervals of wells and tabulate:

| Well | MW1 | MW2 | MW3 | MW4 | MW5 | MW6 | MW7 | MW8 | P1 | P2 |
|---|---|---|---|---|---|---|---|---|---|---|
| Screen length | 19 | 9 | 17.5 | 9 | 9 | 9 | 14.5 | 15 | no data | no da |
| Aquifer thickness | 17.5 | 8.5 | 9.5 | 6.5 | 8 | 8 | 20 | 20 | — | — |
| S/U | S | S | U | S | S | S | QUALIFIED S | S | — | — |
| see comments | | | * | | | | * | * | | |

S=Satisfactory U=Unsatisfactory

Explain in comments why vertical placement is unsatisfactory [31 TAC 335.192(c)].

Comments: Due to the variable water table elevations, the originally designated upgradient + downgradient monitor wells are not consistantly upgradient + downgradient. The apparent mounding of the water table near Ponds A+B and the North South Aeration Basin + the possible influence of the stormwater canal compound by the seasonal fluctuations of the water table contribute to the complexity the site hydrology.

RE: WELL COMPLETIONS

MW-3 : screened interval is excessive; approximately 7.5' of clay is screened; S+B representatives could not explain (Attachment A

MW-7 + MW-8 : Both monitor wells have comparable aquifer thicknesses; however, one screened interval is completed into the underlying clay (MW-7) + the other is not (MW-8); the difference of completion techniques is not explained. (Attachment A-17 + Attachment A-18)

A. Ground Water Monitoring System

1. Regional Geology ( Houston Sheet, Geol. Atlas of Texas)

   a. Physiographic province Gulf Coastal Plain

   b. Formation(s) Pleistocene Beaumont

      Lithology predominantly clay with silt and fine-grained sand

      Regional dip and gradient SE; Chicot averages 15'/mile

   c. Depth to ~~top~~/bottom of useable quality (<~~10,000~~ 3000 mg/l TDS) ground water 1400 BSL, determined by TDWR Report 236

   d. Regional direction of ground water flow N-NW * see comments, determined by TDWR Report 241.

   e. Is site on recharge area of major/minor named aquifer (Y/N)? N

   f. Part B permit application - Geology Report: pages Part B permit withdrawn + Closure Plan submitted; Hydrogeologic Site Investiga included in Section 3 of Closure Plan.

Comments: The regional potentiometric surface of the aquifer ~~have~~ has been altered by heavy pumping of the groundwater in the NASA + LaPort-Baytown areas. The regional SE flow ~~pt~~ path has been altered to the N-NW. Due to the heavy pumping of groundwater in the area, subsidence has also occurred; in the vicinity of Dixie Chemical Company the land has subsided approximately 4 feet from 1943-1973 and approximately 2 feet between 1964-1973 (TDWR Report 188).

2. Site Hydrogeology

a. Attachment A-1 - Site diagram with locations of waste management area(s) [WMA], borings, wells, lines of cross-sections, etc.

b. Site stratigraphy to depth of investigation- 42 feet:

| Unit | Thickness | Description |
|---|---|---|
| Ia | mL 2-20' | dk gray clay |
| Ib | 0-18' | light gray-red-yellow orange clay |
| II | 6-20' | gray to red silty sand-sandy silt |
| III | 3+ | red to red-gray clay (Unit III not drilled through) |

c. Attachment A-2 A-3 -Cross-Section(s)

d. Saturated zone(s) and Aquitard(s)

| Unit | Depth Encou. | Saturated Thickness | Potentiometric Rise | Confined/ Unconf. | K | Vertical Gradient |
|---|---|---|---|---|---|---|
| Ia | mL 0-20 | | | | | |
| Ib | 2-28 | not specified | | leaky | no data | |
| II | 13-28 | in report | | confined | | |
| III | 28-40 | | | | | |

e. Is first water-bearing zone in hydraulic communication with deeper zone (~~Y~~/N)? mL No

f. Is aquitard continuous beneath site (Y/~~N~~)? Yes

g. If yes for e or f, calculate rate of downard vertical migration on Attachment * ; Rate * Aquiclude Thickness average = 16' Migration Time * insufficient data .

h. Unit(s) monitored during interim status Unit II .

i. Unit(s) designated as uppermost aquifer ~~in Pt. B~~ MCL Unit II in Closure Report

Concur (Y/~~N~~) mL Yes

2. Site Hydrogeology, comments:

A stormwater canal and the Gulf Coast Waste Disposal Authority Ca[illegible] bisects the Dixie Chemical Company plant site into 2 plants which have been designated as Plant A + Plant B. A total of 8 monitor wells and 2 piezometers have been installed and 5 borings drilled; monitor wells MW 1, 2 + 3 are located at Plant A and MW 4, 5, 6, 7, 8, P-1 + P-2 are located at Plant B. The transmissive zone monitored is present at depths between 13-28 ft. below grade. This zone consists of silty sand/sandy silt and varies in thickness from 6-20 ft.

Due to the heavy pumping of groundwater in the LaPorte-Baytown a[illegible] the regional S-SE groundwater flow path has been altered to a N-NW direction. The stormwater canal, proximity to Taylor Bayou and seasonal water level fluctuations contribute to the local variations of the flow paths within t[illegible] plant site. Plant A, located to the west of the stormwater canal, exhib[illegible] flow path reversals. Water level data from 12/17/85 + 3/24/86 (Attachme[illegible] A-9 + A-10) suggest an E-SE gradient while water level data collected on 5/29/85 + 7/3/85 (Attachments A-7 + A-8), indicate a mounding of the water table beneath Ponds A+B. Water level data - only 3 monitor wells makes it difficult to fully ascertain flow path characteristics at Plant A and/or the impact of the adjacent stormwater ca[illegible] Conversely, at Plant B, the groundwater flow path is generally toward the W-NW; mounding of the water table is apparent in the vicinity of the ^{[illegible]} North + South Aeration Basins.

3. Monitor Well Construction

a. Attachment ~~A-5~~ A-4 -Well construction diagrams.

b. Attachment A-6 -Table of well construction details.

c. Do monitor well installation techniques and materials of construction satisfy 31 TAC 335.192(c)-Y/N? Yes

d. Comments: The as-built diagram of monitor well MW-3 indicate a red, silty sand unit present between the depths of 18 - 27.5 f. The interval screened is between 10' - 27.5'; S+B Engineers could not justify why 7.5 to 8.0 feet of clay was screened.

4. Site Ground Water Movement

a. Attachment ~~A-8 A-10~~ A-7 A-9 -Water table/Potentiometric Surface Map. (Indicate inferred flow directions directly on map. Include several maps to show the range of observed water level measurements).

b. Calculate minimum and maximum observed gradients in units of feet/foot. Show on map and list here Plant A gradient range ⇒ 0.0C 0.0015 ft/ft; Plant B gradient range ⇒ 0.0009 ft/ft - 0.0015 ft/f

c. Attachment A-11 -Calculations of average linear velocity (v) for gradients reported above, showing all assumptions. List results here: The $\bar{v}$ calculated range is: 0.49 ft/yr to 6.2 ft/yr.

d. Comments: The values for permeability and porosity are estimated assumed. The only site-specific hydrologic data submitted is calculated specific capacities after 5 minutes of pumping (Attachment A-12)

5. Monitor Well Placement

a. Indicate distance(s) of upgradient/background well(s) from WMA
Plant A: Mw-1 is not always upgradient; Mw-1 is 460' from Ponds A+B. Plant B: Mw Mw-8 were originally designated upgradient; they are not upgradient.

b. Are designated upgradient well(s) confirmed as upgradient (Y/N)? No [31 TAC 335.192(a)(1)] refer to Attachment A-13, A-14

c. Are upgradient well placements adequate to yield samples representative of background groundwater quality (~~Y~~/N) MCL? [31 TAC 335.192(a)(1)(A)], unaffected by WMA (Y/N) MCL? [31 TAC 335.192(a)(1)(B)] The variable water level elevations and apparent ground- flow path reversals at Plant A does not yield a consis- upgradient monitor well. (or downgradient monitor w

d. Indicate on the site diagram (Att. 15 ~~above~~ MCL) the lateral spacing, in feet, of downgradient/perimeter monitor wells.

e. Are designated downgradient wells confirmed as downgradient (Y/N) see com question above

f. Describe the operator's justification for lateral spacing ______
not specified in Closure Plan report
______.

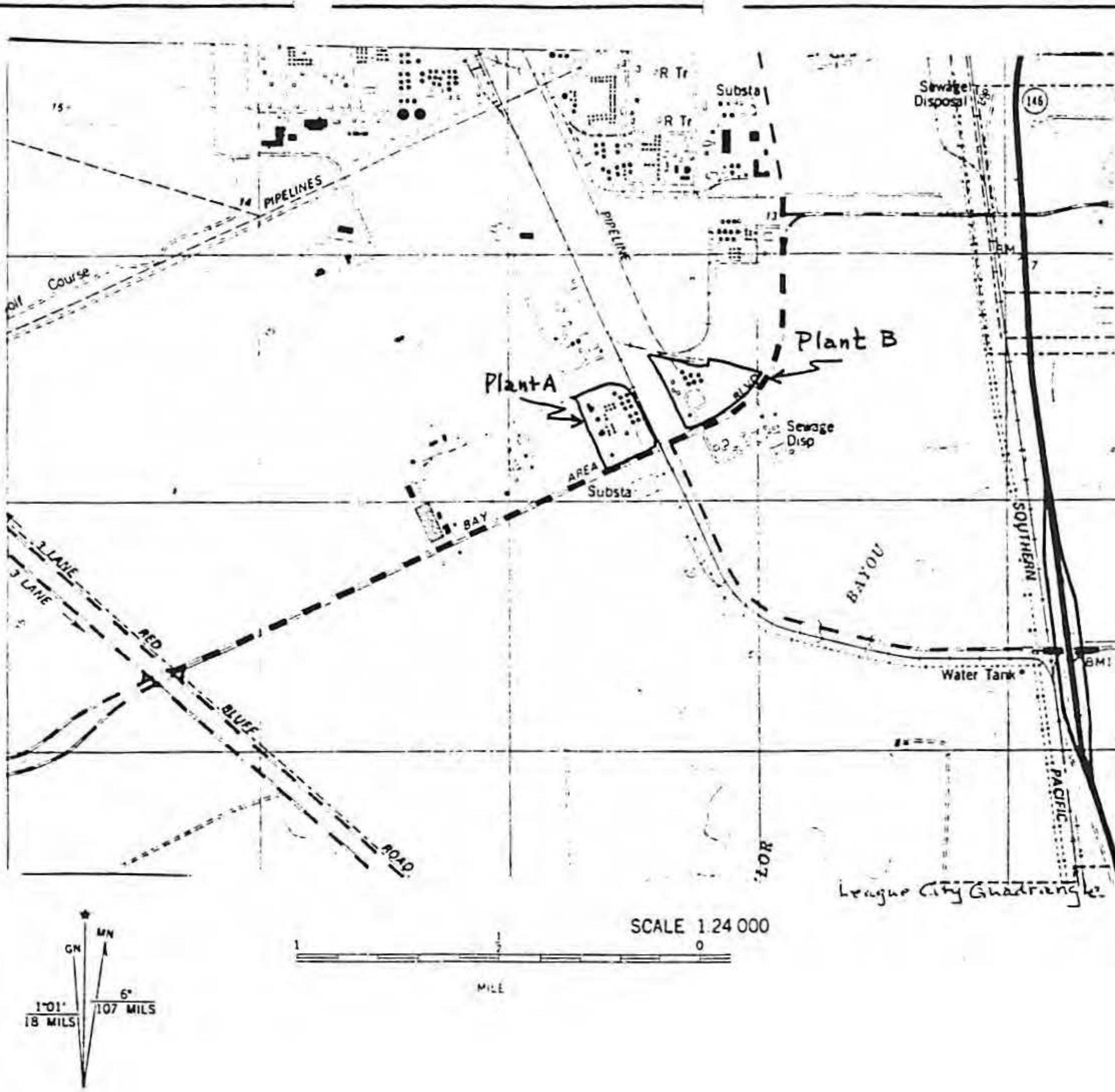
g. Is the lateral spacing sufficient to satisfy the performance standard of 31 TAC 335.192(a)(2)? (Y/N). If no, explain in comments. Additional monitor wells are planned in The Pond A+B area

h. Indicate on map and tabulate below the distances of down gradient wells from the edge of WMA along the direction of groundwater flow:

| | ← Plant A → | | | ← Plant B | | | | (if used) → | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Well | MW 1 | MW 2 | MW 3 | MW 4 | MW 5 | MW 6 | MW 7 | MW 8 | P1 | P2 | |
| Distance (feet) | (460) | 25' | 25' | (800) | (700) | 200' | 85' | 10' | 37' | 75' | |
| Time (yrs) | (938) | 51 | 51 | (1633) | (1429) | 408 | 174 | 20.4 | 75 | 153 | $\bar{v}$ = 0. |
| | 74 | 4 | 4 | (129) | (113) | 32 | 13.7 | 1.6 | 5.9 | 12 | $\bar{v}$ = 6. |
| | * | * | * | * | * | * | * | — | * | * | |
| | * | — | — | * | * | * | — | - | — | — | |

Calculate groundwater travel time based on v calculated above.

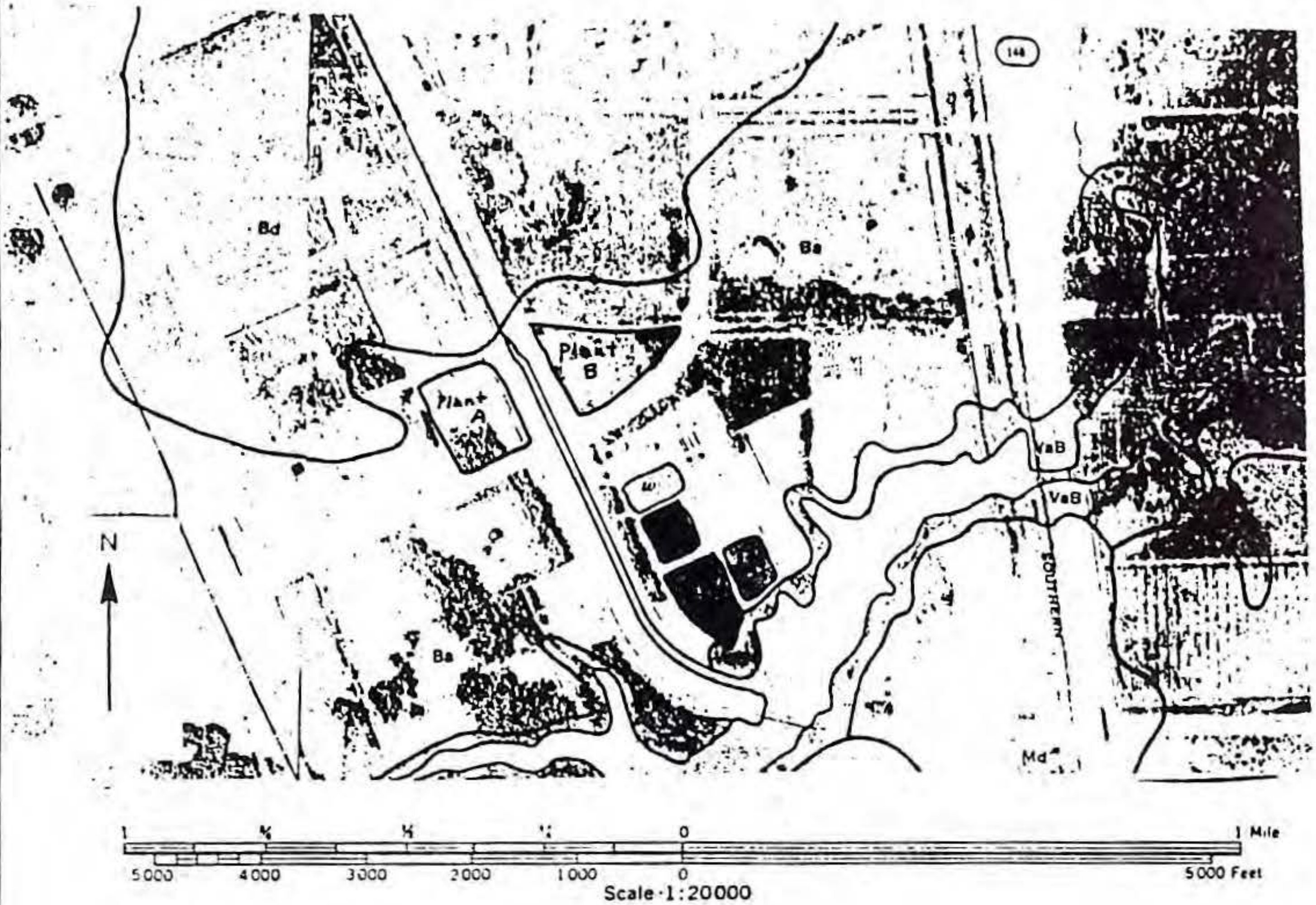
Assuming conservative transport, will each well detect contaminants during the active life or post-closure care period. Indicate those wells that will not with (*).




**TEXAS WATER COMMISSION**
District No.

Dixie Chemical Company
Site Topography

Attachment AA-1




Soil Identification

Ba - Beaumont clay

Soil Characteristics

slope: 0-1%; average 0.3%
drainage: very slow
permeability: very slow

**TEXAS WATER COMMISSION**
District No.

Dixie Chemical Company
Surficial Soil Map

Attachment AA-2

The Closure Plan/Amendment was approved by the TDWR prior to the CME on-site inspection/evaluation. Dixie Chemical Company (DCC) has proposed the installation of three additional monitor wells in the Pond A and B area. Negotiations are in progress with Southern Pacific Railroad and Houston Lighting and Power (H L & P) to install monitor wells in the aforementioned companies' right-of-ways (ROW). The present monitor well system is deemed inadequate, however, the additional monitor wells (that are pending the ROW's contract) are necessary to address violations 1 and 2 noted above.

**Reference 6**

APPL. NO. 10
Hav
COPIES SENT: Dist 4 ✓

TEXAS DEPARTMENT OF WATER RESOURCES

PERMIT APPLICATION
FOR
INDUSTRIAL SOLID WASTE STORAGE/PROCESSING/DISPOSAL FACILITY

PART A - FACILITY BACKGROUND INFORMATION

ACTIVE CORP. C# 086271

GENERAL INFORMATION

A. Applicant: Dixie Chemical Company
(Individual, Corporation, or Other Legal Entity Name)

Address: 10701 Bay Area Blvd.

City: Pasadena State: Texas Zip Code: 77507'

Telephone Number: (312) 474-3271

B. Authorized Agents

1. List those persons or firms authorized to act for the applicant during the processing of the permit application. Also indicate the capacity in which each person may represent the applicant (engineering, legal, etc.). The person listed first will be the primary recipient of correspondence regarding this application. Include the complete mailing addresses and phone numbers.

1) Ralph V. Johnson
Manager Technical Services
P.O. Box 13410
Houston, Texas 77019 (713) 526-2604

2) W.R. Alexander
Plant Manager
Address & Phone Number Above Part A

2. List the individual and his/her mailing address that will be responsible for causing any necessary public notices to be published in the newspaper.

Name: Ralph V. Johnson

Address: P.O. Box 13410

City: Houston, State: Texas Zip Code: 77019

Telephone Number: (713) 526-2604

RECEIVED
AUG 17 1980
PERMIT CONTROL
TDWR

3. List the applicant's authorized agent for service.

Name: Same as Applicant

Address: ______

City: ______ State: ______ Zip Code: ______

Telephone Number: ______

C. Operator: Identify the entity who will conduct facility operations. If same as applicant, state "same as applicant."

Name: Same as Applicant

Address: ______

City: ______ State: ______ Zip Code: ______

Telephone Number: ______

D. Ownership

1. Indicate the ownership status of the facility:

a. Private X

(1) Corporation X
(2) Partnership ___
(3) Proprietorship ___
(4) Non-profit organization ___

b. Public ___

(1) Federal ___
(2) Military ___
(3) State ___
(4) Regional ___
(5) County ___
(6) Municipal ___

c. Other (specify) ______

RECEIVED AUG 17 1980 PERMIT CONTROL TDWR

2. Is facility and site property owned by applicant?

X Yes ___ No

If you checked "no",

a. Submit as an attachment a copy of the lease for use of said facility and/or site property, as appropriate; and

b. Identify the facility owner. If same as applicant in Part A above, state "same as applicant." If different from the applicant, please note that the owner is required to sign the application on page 5.

Name: ______

Address: ______

City: ______ State: ______ Zip Code: ______

Telephone Number: ______

E. Type of Permit Application:

1. New X
2. Amendment ______ (TDWR Permit Number: ______)

F. Registration and Permit Information

1. Denote your TDWR Solid Waste Registration Number. If none, state "none."

30314

2. Indicate (by listing the permit number(s) in the appropriate column below) all existing or pending State and/or Federal permits or construction approvals which pertain to pollution control or industrial solid waste management activities conducted by your plant or at your location. Complete each blank by entering the permit number, or the date of application, or "none".

| Relevant Program and/or Law | Permit No. | Government Agency* |
|---|---|---|
| a. Texas Solid Waste Disposal Act | | |
| b. Wastewater disposal under the Texas Water Code | | |
| c. Underground injection under the Texas Water Code | | |
| d. Texas Clean Air Act | See Separate Listing | |
| e. Texas Uranimum Surface Mining & Reclamation Act | | |
| f. Texas Surface Coal Mining & Reclamation Act | | |
| g. Hazardous Waste Management program under the Resource Conservation and Recovery Act | | |

| | | Permit No. | Gov't. Agency |
|---|---|---|---|
| F. | 2. | | |
| | d. Texas Clean Air Act | C-2363 | TACB |
| | | C-2363A | TACB |
| | | C-561D | TACB |
| | | R-5069 | TACB |
| | | C-5798 | TACB |
| | | C-5798 | TACB |
| | | C-6703 | TACB |
| | | C-1250 | TACB |
| | | C-3870 | TACB |

h. UIC program under the Safe Drinking Water Act

| | | |
|---|---|---|
| i. NPDES program under the Clean Water Act | TX0005380 | EPA |
| j. PSD program under the Clean Air Act | | |
| k. Nonattainment program under the Clean Air Act | | |
| l. National Emission Standards for Hazardous Pollutants (NESHAPS) preconstruction approval under the Clean Air Act | | |
| m. Ocean dumping permits under the Marine Protection Research and Sanctuaries Act | | |
| n. Dredge or fill permits under section 404 of the Clean Water Act | | |
| o. Other relevant environmental permits | | |

* Use the following acronyms for each agency as shown below:

TDWR = Texas Department of Water Resources
TACB = Texas Air Control Board
TRC = Texas Railroad Commission
TDH = Texas Department of Health
TDA = Texas Department of Agriculture
EPA = U. S. Environmental Protection Agency
CORPS = U. S. Army Corps of Engineers

G. Description of Business

1. Give a brief description of the nature of your business.

   We manufacture specialty organic chemicals and we perform custom chemical manufacture for others.

2. List the principal products and/or services which are provided by your plant. Please itemize by Standard Industrial Classification (SIC) codes.

| | | |
|---|---|---|
| 1) | Specialty Organic Chemicals | 2869 |
| 2) | Ethylene Glycols 2869 | 2869 |
| 3) | Custom Manufacture of Organic Chemicals | 2869 |

I, RALPH L PELLEY, VICE PRESIDENT R&D
(Name) (Title)

I, ____________________, ____________________
(Name) (Title)

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete.

Signature: Ralph L Pelley, Date: Aug 15 1980

Signature: ____________________, Date: ____________________

SUBSCRIBED AND SWORN to before me by the said Ralph L. Pelley

on this 15th day of August 19 80

My commission expires on the 30th day of November 19 81

Notary Public in and for

Harris County, Texas

**TEXAS DEPARTMENT OF WATER RESOURCES**
**AUSTIN, TEXAS**

Receipt No. 83- 2045

Date 12/22/82.

Amount 5.00

Received From Dixie Chemical Company

Address Pasadena, TX For

| | | | | |
|---|---|---|---|---|
| G.R. Fd. 001, Unappr. | CC 09644 | | | Suspense Fd. 900 CC 09642 |
| G.R. Fd. 001, Appr | CC | | | Filing Fee |
| Spec. Fd. 041 FY | CC | | | Recording |
| Spec. Fd. 153 FY 83 | CC 11371 | | 5.00 | Use Fee |
| Spec. Fd. 158 FY | CC | | | Storage |
| Spec. Fd. ___ FY | CC | | | Postage |

Comptr. Rev Code 3754 TDWR Rev Code

Type of Fee or Revenue Waste Discharge Permit - #10301 - Postage

Type of Remittance Ck #1688 Received by MW

TDWR-0756

II. SITE BACKGROUND INFORMATION

A. Location of Site

1. Facility Name: Dixie Chemical Company

Street Address, if available: 10701 Bay Area Blvd.

Pasadena, Texas 77507 County: Harris

2. Are your waste management operations within the extraterritorial jurisdiction of a municipality?

X Yes ____ No

If you checked "yes," what municipality? City of Houston

3. Give a verbal description of the location of the facility site with respect to known or easily identifiable landmarks.

Located at the corner of Bay Area Blvd. and Chemical Road in Bayport industrial district. Located 300 yards N.W. of GCWDA site site.

4. Detail the access routes from the nearest U.S. or State Highway to the facility site.

Exit 146 on Port Road. Go West on Port Road to Bay Area Blvd. Go West on Bay Area Blvd. to Chemical Road. Dixie Chemical is at the intersection of Bay Area Blvd. & Chemical Road.

5. Submit as "Attachment A" a United States Geological Survey (USGS), 7½ minute quadrangle map. Indicate on this map the location of the site and the land use patterns of the areas within ! mile (1.6 km) of the site boundaries (e.g., residential, commercial, recreational, agricultural, undeveloped, etc.). Each area of land use should be labeled on the map. (Note: if such a map is not available, submit a substitute map such as a State Department of Highways and Public Transportation county map with sufficient scale to adequately show the site location and surrounding land use patterns.

6. a. Submit as "Attachment B" a map indicating the boundaries of all adjacent parcels of land, and a list of the names and mailing addresses of all adjacent landowners and other nearby landowners who might consider themselves affected by the activities described by this application. Cross-reference this list to the map through the use of appropriate keying techniques. The map should be a USGS map, a city or county plat, or another map or drawing with a scale adequate enough to show the cross-referenced affected landowners.

b. Indicate from what source(s) the names and addresses of persons identified as affected were obtained.

City ______________
County ______________
School District ______________
Water District ______________
Abstract Co. ______________
Other (specify) Friendswood Development Company

7. Enter the geographical coordinates of the site:

Latitude: 29 deg 36 min 43 sec N

Longtitude: 95 deg 03 min 02 sec W

8. Is the facility located on Indian lands? Check one:

_____ Yes X No

B. Legal Description of Site

Submit as "Attachment C" a legal description of the entire tract of land upon which the waste management operations referred to in this permit application occur or will occur.

C. Site Environmental and Technical Information

1. Climatic and Hydrologic

a. Is any portion of your waste management facility site (including proposed, active, and inactive portions) subject to flooding from adjacent or nearby surface water bod'es under the following conditions?

| 24-hr Rainfall Event | Yes | No |
|---|---|---|
| 5-year | | X |
| 50-year | | X |
| 100-year | X | |

b. Are there any producing groundwater wells on your site property?

_____ Yes X No

If you checked "yes,"

(1) Indicate the number of such wells: _____ and;

(2) Indicate the corresponding water uses below:

(a) Industrial uses:
Cooling water ____
Process water ____
Fire-control water ____

(b) Potable (drinking) water ____

(c) Agricultural uses:
Irrigation water for livestock food crops or grazing land ____
Livestock watering ____
Irrigation water for human food crops ____

c. Are any adjacent or nearby surface waters utilized by the applicant?

____ Yes _X_ No

If you checked "yes," indicate the corresponding water uses below:

(1) Industrial uses:
Cooling water ____
Process water ____
Fire-control water ____

(2) Potable (drinking) water ____

(3) Agricultural uses:
Irrigation water for livestock food crops or grazing land ____
Livestock watering ____
Irrigation water for human food crops ____

2. Site Land Use and Subsidence Information

a. Is any portion of the overall site property utilized for agricultural purposes?

____ Yes _X_ No

If you checked "yes," indicate the corresponding uses below:

(1) Grazing ____
(2) Livestock food crop ____
(3) Human food crop ____

If you checked no. (2) or (3), specify the types of crops grown. ________________________________________

b. Is any portion of the overall site property subject to land subsidence?

_X_ Yes ____ No

If you checked "yes," estimate the magnitude of the greatest subsidence that has occurred (in units of feet). 2'

III. WASTES AND WASTE MANAGEMENT

A. Waste Generation and Management Activities

Is any hazardous industrial solid waste (see Title 40, Code of Federal Regulations, Part 261) presently or proposed to be generated at your facility?

XX Yes ___ No

If you checked "no," go to Section III.B.2. below.
If you checked "yes," answer the following question.

1. Are you presently registered with TDWR as a solid waste generator?

X Yes ___ No

If you checked "no," contact the Solid Waste Section of TDWR in Austin, Texas to obtain registration information. Also, continue with the application form (go to Number 2 below).

If you checked "yes," go to Section I of your Notice of Registration, determine which of your wastes are hazardous, and list these wastes (and mixtures) in Table III-1 (see Number 2 below).

2. Complete Table III-1 below, listing all hazardous wastes and all mixtures containing any hazardous waste which are presently or proposed to be generated at your facility. (see 40 CFR 261.31-33), attaching additional copies as necessary.

In this table, "TDWR Sequence Number" refers to the number in the left-hand column in Section I of your Notice of Registration (Note: if you are not registered with TDWR, enter "NA" for TDWR Sequence Number and TDWR Waste Code Number).

For the EPA Hazard Code and EPA Hazardous Waste Numbers, see 40 CFR 261.30-33. For annual quantity, provide the amount in units of pounds (as generated) for each waste and/or waste mixture.

Please group the listings of wastes by SIC code, insofar as your processes are designated by SIC codings. Also, within the general SIC code groups, give a brief description of the specific process or operation from which the waste has been generated.

B. Waste Management Facilities Summary

1. For each waste and waste mixture listed in Table III-1 that is presently or proposed to be managed on-site, provide the summary sheet shown in Table III-2 (Note: you must make copies of Table III-2 and submit the completed set of tables as "Attachment D").

Table III-I Generated Hazardous Wastes and Management Activities

| Verbal Description of Waste | TDWR Sequence Number | TDWR Waste Code Number | EPA Hazard Code | EPA Hazardous Waste No. | Waste Management Activities (Check applicable items): Off-Site Disposal | On-Site: Storage[1] | On-Site: Processing[2] | On-Site: Disposal | Annual Quantity Generated (lbs) | SIC Code and Process |
|---|---|---|---|---|---|---|---|---|---|---|
| 1) T-335 Plant "B: Residue | 6. | 110760 | T | | X | X | | | 7.8MM | 2869 |
| 2) T-105 Reactor Waste | 3. | 109480 | I | | X | X | | | 2.4MM | 2869 |
| 3) T-107 Reactor Waste | 3. | 109480 | I | | X | X | | | 2.4MM | 2869 |
| 4) T-1218 1200 Area Waste | 12. | 110540 | I | | X | X | | | 960,000 | 2869 |

1 "Storage" means the interim containment or control of waste after generation and prior to ultimate disposal.

2 "Processing" means the extraction of materials, transfer, volume reduction, conversion to energy, or other separation and preparation of solid waste for reuse or disposal, including the treatment or neutralization of hazardous waste so as to render such waste nonhazardous, safer for transport, amenable for recovery, amenable for storage, or reduced volume. The "transfer" of solid waste for reuse or disposal as used above, does not include the actions of a carrier in conveying or transporting solid waste by truck, ship, pipeline, or other means.

Table III-2 Hazardous Waste Management Facility Component Summary Sheet

Verbal Description of Waste ____________________

Process (see last column in Table III-1) ____________________

TDWR Sequence Number of Waste (if assigned) ____________________

Indicate the facility components used for storage/processing/disposal of the above-specified waste by entering the number of such facility components by which this waste is managed.

___ Lagoon/Pond (unlined)

___ Lagoon/Pond (lined)

___ Basin (earthen, above-grade lined)

___ Basin (earthen, above-grade unlined)

___ Basin (earthen, below-grade lined)

___ Basin (earthen, below-grade unlined)

___ Basin (concrete, above-grade lined)

___ Basin (concrete, above-grade unlined)

___ Basin (concrete, below-grade lined)

___ Basin (concrete, below-grade unlined)

___ Basin (other)

___ Pit (lined)

___ Pit (unlined)

___ Incinerator

___ Open Controlled Incineration Area

___ Boiler (energy-producing)

___ Landfill (sanitary)

___ Landfill (surface, open)

___ Landfill (other)

___ Landfarm

___ Landspreading Area

___ Spray Irrigation Area

___ Flood Irrigation Area

___ Septic Tank/Drain Field

___ Injection Well

___ Tank (surface storage)

___ Tank (sub-surface storage)

___ Tank (surface processing)

___ Tank (sub-surface processing)

___ Tank (other)

___ Drum Storage Area (open)

___ Drum Storage Area (enclosed)

___ Drum Storage Area (other)

___ Bulk Storage Area (open)

___ Bulk Storage Area (enclosed)

___ Bulk Storage Area (other)

___ Other (specify ____________________ )

2. Has the applicant at any time conducted the on-site storage, processing, or disposal of industrial solid waste now identified or listed as hazardous waste?

**X** Yes ____ No

If you checked "yes," complete Table III-3 indicating the hazardous industrial solid waste management facility components which were once utilized at your plant site but are no longer in service (i.e., inactive facility components). **All facilities are still in service and detailed in Tables 111-2 and 111-4.**

If you checked "no," and if no hazardous industrial solid waste is presently or proposed to be generated or managed at your facility, then you need not file this permit application. Otherwise, proceed with application form.

3. For each facility component indicated in Table III-2 (Attachment D) and Table III-3, complete the following Table III-4 attaching additional copies as necessary. Enter the name of each facility component as specified in the earlier tables.

   Give the design capacity of each facility component in any of the units shown. In the case of inactive facilities for which design details are unavailable, an estimate of the design capacity is sufficient.

   Please note that each facility component should be described in your own words on the line provided for "verbal description."

4. Provide an estimate of the total weight (lbs) of hazardous industrial solid waste material that has been disposed of and/or stored within your site boundaries and not removed to another site. **All hazardous waste has been removed to another site except for that which is iinstantaneously stored.**

C. Location of Waste Management Facilities and Components

1. Submit as "Attachment E" a drawn-to-scale topographic map (or other map if a topographic map is unavailable) extending one mile (and only one mile) beyond the property boundaries of the overall plant site, depicting the following:

   a. The approximate boundaries of the site (described in Section II B) and within these boundaries, the location and boundaries of the areas occupied by each active, inactive, and proposed facility component (see Tables III-2 and III-3 for facility components). Each depicted area should be labeled to identify the facility component(s), component status (i.e., active, inactive, or proposed), and area size in acres.

Table III-3 Inactive Hazardous Industrial Solid Waste Management Facility Components

Indicate the inactive facility components which were used for storage/processing/disposa of hazardous wastes or mixtures containing any hazardous waste by entering the number of such facility components in the space provided.

| | |
|---|---|
| ___ Lagoon/Pond (lined) | ___ Landspreading Area |
| ___ Basin (earthen, above-grade lined) | ___ Spray Irrigation Area |
| ___ Basin (earthen, above-grade unlined) | ___ Flood Irrigation Area |
| ___ Basin (earthen, below-grade lined) | ___ Septic Tank/Drain Field |
| ___ Basin (earthen, below-grade unlined) | ___ Injection Well |
| ___ Basin (concrete, above-grade lined) | ___ Tank (surface storage) |
| ___ Basin (concrete, above-grade unlined) | ___ Tank (sub-surface storage) |
| ___ Basin (concrete, below-grade lined) | ___ Tank (surface processing) |
| ___ Basin (concrete, below-grade unlined) | ___ Tank (sub-surface processing) |
| ___ Basin (other) | ___ Tank (other) |
| ___ Pit (lined) | ___ Drum Storage Area (open) |
| ___ Pit (unlined) | ___ Drum Storage Area (enclosed) |
| ___ Incinerator | ___ Drum Storage Area (other) |
| ___ Open Controlled Incineration Area | ___ Bulk Storage Area (open) |
| ___ Boiler (energy-producing) | ___ Bulk Storage Area (enclosed) |
| ___ Landfill (sanitary) | ___ Bulk Storage Area (other) |
| ___ Landfill (surface, open) | ___ Other (specify ___________ |
| ___ Landfill (other) | ___________________________) |

Table III-4 Hazardous Waste Facility Components List

| Facility Component | | Status | | | Design Capacity | | | Number of Years Utilized | Date in Servi |
|---|---|---|---|---|---|---|---|---|---|
| Name | TDWR Seq. No. | Inactive | Active | Proposed | (cu yds) | (gal) | (lbs) | | |
| 1) T-335 Plant "B" Residue | 6. | | X | | | 10,000 gal | | 6 | 1974 |
| Verbal Description: | | | | | | | | | |
| 2) T-105 Reactor Area Waste | 3. | | X | | | 8,000 gal | | 110 | 1970 |
| Verbal Description: | | | | | | | | | |
| 3) T-107, Reactor Area Waste | 3. | | X | | | 4,000 gal | | 10 | 1970 |
| Verbal Description: | | | | | | | | | |
| 4) T-1218, 1200 Area Waste | 12. | | X | | | 10,000 gal | | 1 | 1979 |
| Verbal Description: | | | | | | | | | |
| | | | | | | | | | |
| Verbal Description: | | | | | | | | | |
| | | | | | | | | | |
| Verbal Description: | | | | | | | | | |

b. The overall facility and all surface intake and discharge structures;

c. All injection wells where liquids are injected underground;

d. All known monitor wells and boreholes within the property boundaries of the overall plant site; and

e. All wells, springs, other surface water bodies, and drinking water wells within the map area and the purpose for which each water well is used (e.g., domestic, livestock, agricultural, industrial, etc.).

2. Submit as "Attachment F" photographs which clearly delineate all hazardous waste facility structures and storage, processing, and disposal areas, as well as sites of future storage, processing, and disposal areas.

D. Flow Diagram/Description

Show as "Attachment G" process flow diagrams or step-by-step word descriptions of the process flow, depicting the handling, collection, storage, processing, and/or disposal of each of the hazardous wastes previously listed in this application.

The flow diagrams or descriptions should include the following information:

1. Originating point of each waste and waste classification code;

2. Means of conveyance utilized in every step of the process flow;

3. Name and function of each facility component through which the waste passes;

4. The ultimate disposition of all wastes (if off-site, specify "off-site") and waste residues.

IV. INDEX OF ATTACHMENTS

List and index below all attachments to this application and indicate if included or not included:

| Item | Mandatory Attachments | Attachment | Included | Not Included |
|---|---|---|---|---|
| II.A.5. | USGS map | A | X | |
| II.A.6.a. | Affected landowners | B | X | |
| II.B. | Site legal description | C | X | |
| III.B.1. | Hazardous waste facility component summary sheets | D | X | |
| III.C.1. | Facility boundaries and adjacent waters map | E | X | |
| III.C.2. | Photographs | F | X | |
| III.D. | Process flow diagram/description | G | X | |
| | **Other Attachments as Required** | | | |
| I.D.2.a. | Lease | | | |
| III.A.2. | Additional generated waste list (Table III-1) | | | |
| III.B.3. | Additional hazardous waste facility components list (Table III-4) | | | |

EXHIBIT "A" TO DEED DATED MAY 10, 1971,
FROM FRIENDSWOOD DEVELOPMENT COMPANY TO DIXIE
CHEMICAL COMPANY, INC.

ATTACHMENT "C"

DEED RECOR
VOL 8418 PAGE

EIGHTEEN AND ONE HUNDRED AND SIXTEEN THOUSANDTHS (18.116) ACRES OF LAND OUT OF THE DAVID HARRIS LEAGUE A-25, HARRIS COUNTY, TEXAS, DESCRIBED AS FOLLOWS:

128-32-1835

COMMENCING at Rod 2087 marking the east corner of a 13.880-acre tract described in a deed from Friendswood Development Company to Dixie Chemical Company dated August 29, 1967, and recorded in Volume 6869 at Page 572 of the Deed Records of Harris County, Texas, said rod being in the northwesterly right-of-way line of Bay Area Boulevard;

THENCE N 62° 26' 37" E, along the northwesterly right-of-way line of Bay Area Boulevard at 50.00 feet pass the south corner of a 120-foot wide tract referred to as Tract 1 in deed to Houston Lighting & Power Company in deed recorded in Volume 7146, Page 37 of the Deed Records of Harris County, Texas, continuing same bearing a total distance of 125.00 feet to a point for the southernmost east corner of the 120-foot wide Houston Lighting & Power Company tract;

THENCE N 27° 32' 40" W with a right-of-way line of Bay Area Boulevard, 13.00 feet to a point for the re-entrant corner of the Houston Lighting & Power Company 120-foot wide tract, said corner also being a corner of Bay Area Boulevard;

THENCE N 62° 26' 37" E, along said northwesterly right-of-way line of Bay Area Boulevard at 45.00 feet pass the east corner of the 120-foot wide Houston Lighting & Power Company tract, continuing same bearing a total distance of 345.00 feet to Rod 2533 marking the east corner of a 60-foot wide waste channel right-of-way and the PLACE OF BEGINNING of the herein-described tract;

THENCE N 29° 19' 48" W, along the northeasterly line of said waste channel right-of-way, at 17.99 feet pass a 3-inch galvanized iron pipe fence corner post, continuing the same bearing and with

ATTACHMENT "C".

sum of Ten Dollars ($10.00) and other valuable

in cash to it paid by DIXIE CHEMICAL COMPANY, a corporation, the receipt of which is hereby acknowledged, has granted, sold and conveyed, and does hereby grant, sell and convey, subject to the reservations and exceptions hereinafter made and the terms and provisions hereof, unto the said DIXIE CHEMICAL COMPANY, hereinafter called "Grantee", the following described land and premises:

13.88 acres
8/67

FILED
AUG 29 3 41 PM 1967
COUNTY CLERK
HARRIS COUNTY, TEXAS

THIRTEEN AND EIGHT HUNDRED AND EIGHTY THOUSANDTHS (13.880) ACRES OF LAND OUT OF THE DAVID HARRIS LEAGUE A-25, HARRIS COUNTY, TEXAS, DESCRIBED AS FOLLOWS:

BEGINNING at Rod 2233 marking the intersection of the north right-of-way line of Bay Area Boulevard (174 feet wide) and the east right-of-way line of Stauffer Road (100 feet wide), said point being N 62° 26' 37" E 100.00 feet from Rod 2182 marking the southeast corner of a 6.676-acre tract described as Parcel 1 in a deed from Friendswood Development Company to Velsicol Chemical Corporation dated April 3, 1967, recorded in Volume 6719 at Page 537 of the Deed Records of Harris County, Texas;

THENCE N 27° 32' 40" W along said east right-of-way line of Stauffer Road 871 ...
in the south...

Table III-2 Hazardous Waste Management Facility Component Summary Sheet

Verbal Description of Waste: T-105 Reactor Area Waste

Process (see last column in Table III-1): 2869

TDWR Sequence Number of Waste (if assigned): [illegible]

Indicate the facility components used for storage/processing/disposal of the above-specified waste by entering the number of such facility components by which this waste is managed.

| | | | |
|---|---|---|---|
| ___ | Lagoon/Pond (unlined) | ___ | Landfarm |
| ___ | Lagoon/Pond (lined) | ___ | Landspreading Area |
| ___ | Basin (earthen, above-grade lined) | ___ | Spray-Irrigation Area |
| ___ | Basin (earthen, above-grade unlined) | ___ | Flood Irrigation Area |
| ___ | Basin (earthen, below-grade lined) | ___ | Septic Tank/Drain Field |
| ___ | Basin (earthen, below-grade unlined) | ___ | Injection Well |
| ___ | Basin (concrete, above-grade lined) | XX | Tank (surface storage) |
| ___ | Basin (concrete, above-grade unlined) | ___ | Tank (sub-surface storage) |
| ___ | Basin (concrete, below-grade lined) | ___ | Tank (surface processing) |
| ___ | Basin (concrete, below-grade unlined) | ___ | Tank (sub-surface processing) |
| ___ | Basin (other) | ___ | Tank (other) |
| ___ | Pit (lined) | ___ | Drum Storage Area (open) |
| ___ | Pit (unlined) | ___ | Drum Storage Area (enclosed) |
| ___ | Incinerator | ___ | Drum Storage Area (other) |
| ___ | Open Controlled Incineration Area | ___ | Bulk Storage Area (open) |
| ___ | Boiler (energy-producing) | ___ | Bulk Storage Area (enclosed) |
| ___ | Landfill (sanitary) | ___ | Bulk Storage Area (other) |
| ___ | Landfill (surface, open) | ___ | Other (specify ________ ) |
| ___ | Landfill (other) | | |

ATTACHMENT "D"

## Table III-2 Hazardous Waste Management Facility Component Summary Sheet

Verbal Description of Waste: T-335 Plant B Residue

Process (see last column in Table III-1): 2869

TDWR Sequence Number of Waste (if assigned): ____

Indicate the facility components used for storage/processing/disposal of the above-specified waste by entering the number of such facility components by which this waste is managed.

| | | | |
|---|---|---|---|
| ___ | Lagoon/Pond (unlined) | ___ | Landfarm |
| ___ | Lagoon/Pond (lined) | ___ | Landspreading Area |
| ___ | Basin (earthen, above-grade lined) | ___ | Spray-Irrigation Area |
| ___ | Basin (earthen, above-grade unlined) | ___ | Flood Irrigation Area |
| ___ | Basin (earthen, below-grade lined) | ___ | Septic Tank/Drain Field |
| ___ | Basin (earthen, below-grade unlined) | ___ | Injection Well |
| ___ | Basin (concrete, above-grade lined) | XX | Tank (surface storage) |
| ___ | Basin (concrete, above-grade unlined) | ___ | Tank (sub-surface storage) |
| ___ | Basin (concrete, below-grade lined) | ___ | Tank (surface processing) |
| ___ | Basin (concrete, below-grade unlined) | ___ | Tank (sub-surface processing) |
| ___ | Basin (other) | ___ | Tank (other) |
| ___ | Pit (lined) | ___ | Drum Storage Area (open) |
| ___ | Pit (unlined) | ___ | Drum Storage Area (enclosed) |
| ___ | Incinerator | ___ | Drum Storage Area (other) |
| ___ | Open Controlled Incineration Area | ___ | Bulk Storage Area (open) |
| ___ | Boiler (energy-producing) | ___ | Bulk Storage Area (enclosed) |
| ___ | Landfill (sanitary) | ___ | Bulk Storage Area (other) |
| ___ | Landfill (surface, open) | ___ | Other (specify ____________ |
| ___ | Landfill (other) | | ____________________) |

Table III-2 Hazardous Waste Management Facility Component Summary Sheet

Verbal Description of Waste: T-107 Reactor Area Waste

Process (see last column in Table III-1): 2869

TDWR Sequence Number of Waste (if assigned): 3

Indicate the facility components used for storage/processing/disposal of the above-specified waste by entering the number of such facility components by which this waste is managed.

| | |
|---|---|
| ___ Lagoon/Pond (unlined) | ___ Landfarm |
| ___ Lagoon/Pond (lined) | ___ Landspreading Area |
| ___ Basin (earthen, above-grade lined) | ___ Spray-Irrigation Area |
| ___ Basin (earthen, above-grade unlined) | ___ Flood Irrigation Area |
| ___ Basin (earthen, below-grade lined) | ___ Septic Tank/Drain Field |
| ___ Basin (earthen, below-grade unlined) | ___ Injection Well |
| ___ Basin (concrete, above-grade lined) | XX Tank (surface storage) |
| ___ Basin (concrete, above-grade unlined) | ___ Tank (sub-surface storage) |
| ___ Basin (concrete, below-grade lined) | ___ Tank (surface processing) |
| ___ Basin (concrete, below-grade unlined) | ___ Tank (sub-surface processing) |
| ___ Basin (other) | ___ Tank (other) |
| ___ Pit (lined) | ___ Drum Storage Area (open) |
| ___ Pit (unlined) | ___ Drum Storage Area (enclosed) |
| ___ Incinerator | ___ Drum Storage Area (other) |
| ___ Open Controlled Incineration Area | ___ Bulk Storage Area (open) |
| ___ Boiler (energy-producing) | ___ Bulk Storage Area (enclosed) |
| ___ Landfill (sanitary) | ___ Bulk Storage Area (other) |
| ___ Landfill (surface, open) | ___ Other (specify ________ |
| ___ Landfill (other) | ________________ ) |

Table III-2 Hazardous Waste Management Facility Component Summary Sheet

Verbal Description of Waste T-1218 1200 Area Waste

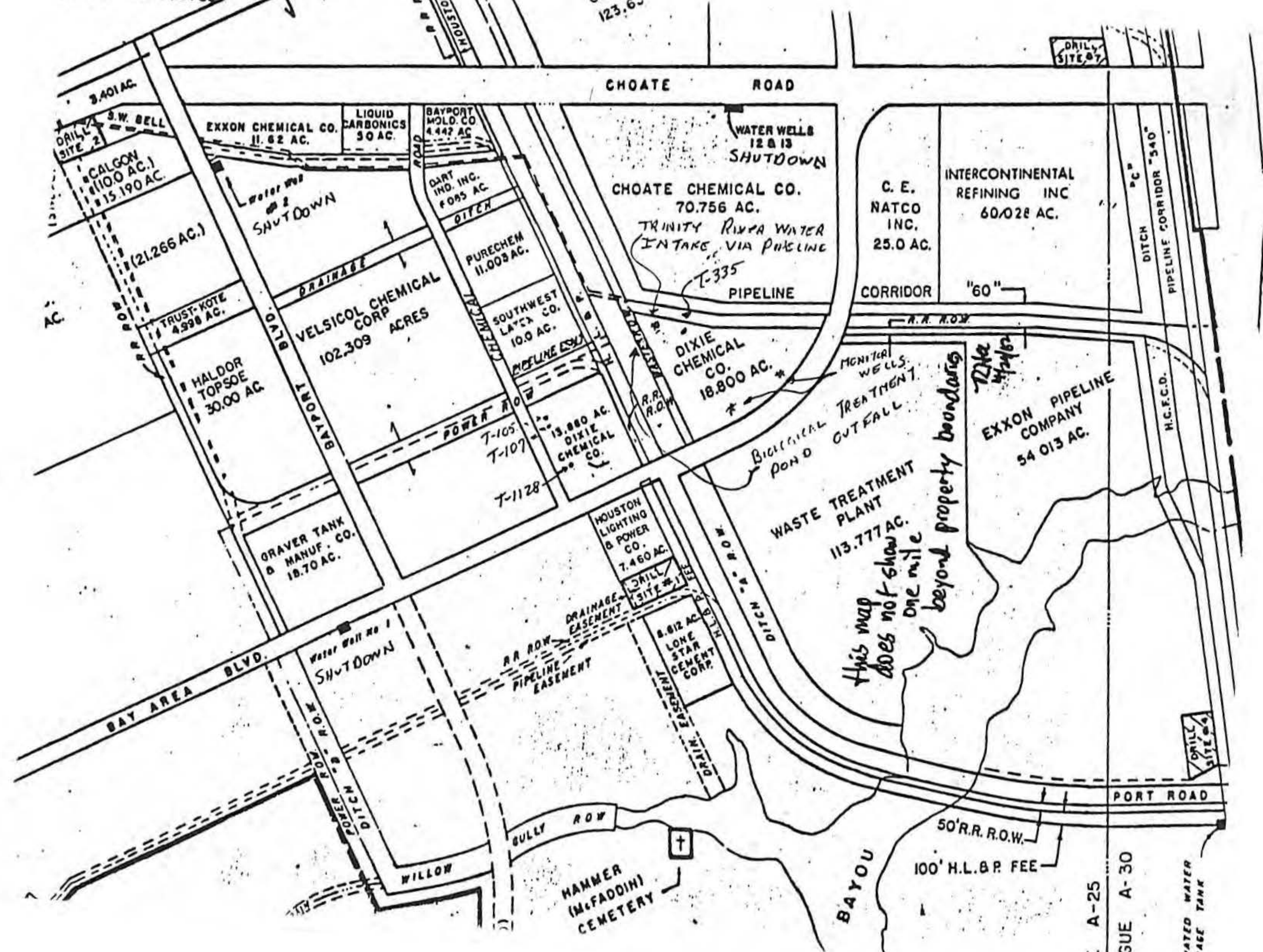
Process (see last column in Table III-1) 2869

TDWR Sequence Number of Waste (if assigned) 12

Indicate the facility components used for storage/processing/disposal of the above-specified waste by entering the number of such facility components by which this waste is managed.

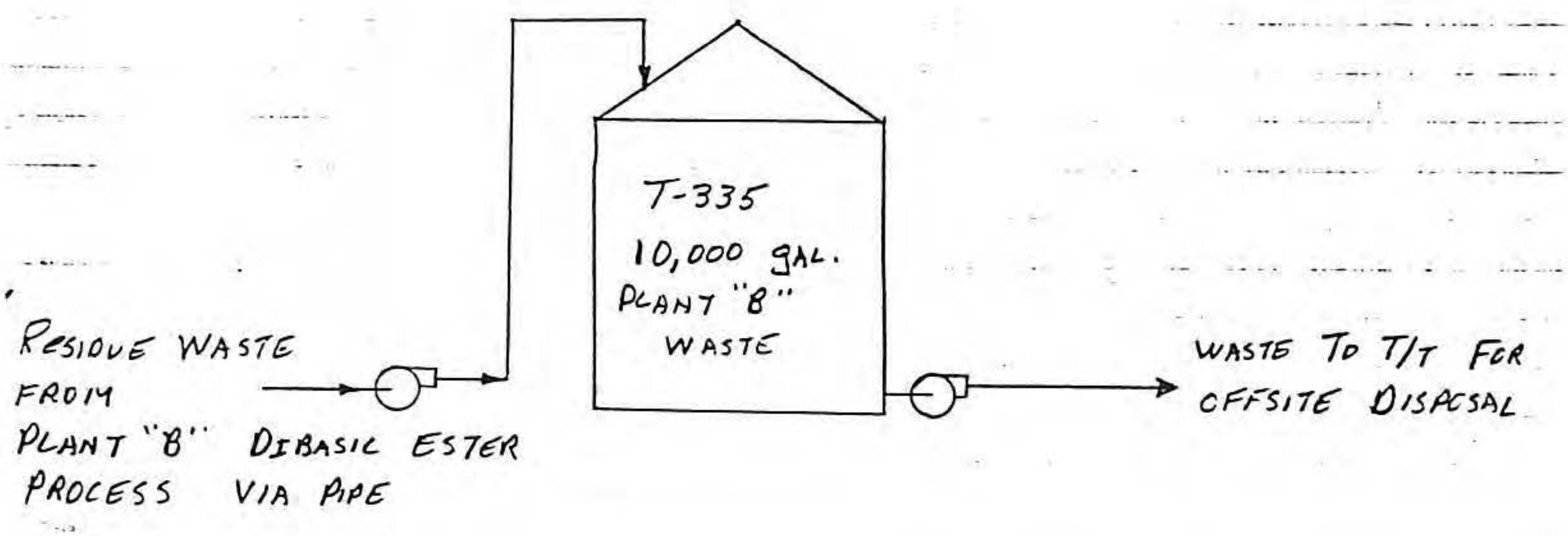
| | |
|---|---|
| ___ Lagoon/Pond (unlined) | ___ Landfarm |
| ___ Lagoon/Pond (lined) | ___ Landspreading Area |
| ___ Basin (earthen, above-grade lined) | ___ Spray Irrigation Area |
| ___ Basin (earthen, above-grade unlined) | ___ Flood Irrigation Area |
| ___ Basin (earthen, below-grade lined) | ___ Septic Tank/Drain Field |
| ___ Basin (earthen, below-grade unlined) | ___ Injection Well |
| ___ Basin (concrete, above-grade lined) | XX Tank (surface storage) |
| ___ Basin (concrete, above-grade unlined) | ___ Tank (sub-surface storage) |
| ___ Basin (concrete, below-grade lined) | ___ Tank (surface processing) |
| ___ Basin (concrete, below-grade unlined) | ___ Tank (sub-surface processing) |
| ___ Basin (other) | ___ Tank (other) |
| ___ Pit (lined) | ___ Drum Storage Area (open) |
| ___ Pit (unlined) | ___ Drum Storage Area (enclosed) |
| ___ Incinerator | ___ Drum Storage Area (other) |
| ___ Open Controlled Incineration Area | ___ Bulk Storage Area (open) |
| ___ Boiler (energy-producing) | ___ Bulk Storage Area (enclosed) |
| ___ Landfill (sanitary) | ___ Bulk Storage Area (other) |
| ___ Landfill (surface, open) | ___ Other (specify ______ ______) |
| ___ Landfill (other) | |

ctive facilities



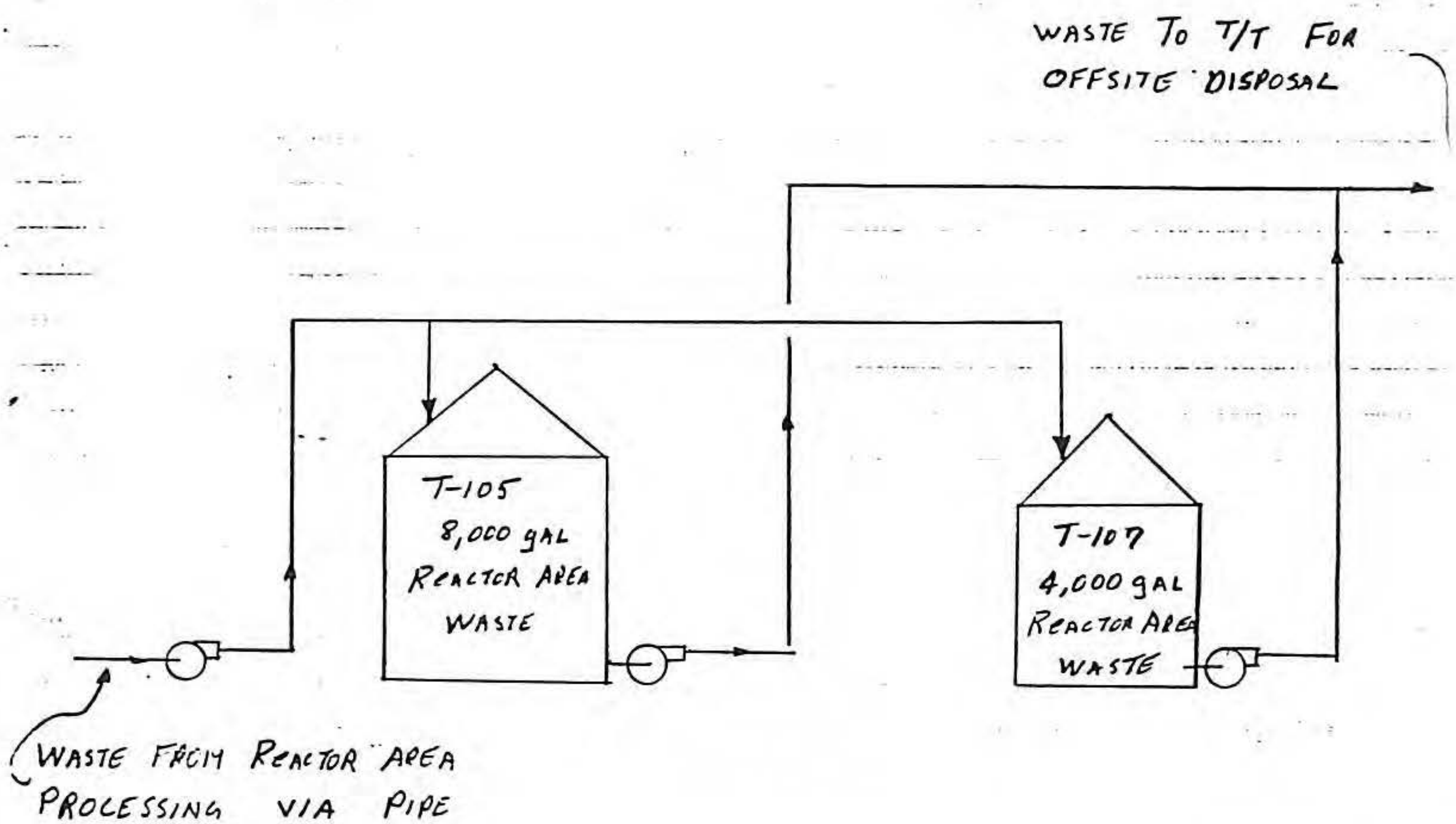
ATTACHMENT "G"

PROCESS FLOWSHEET T-335



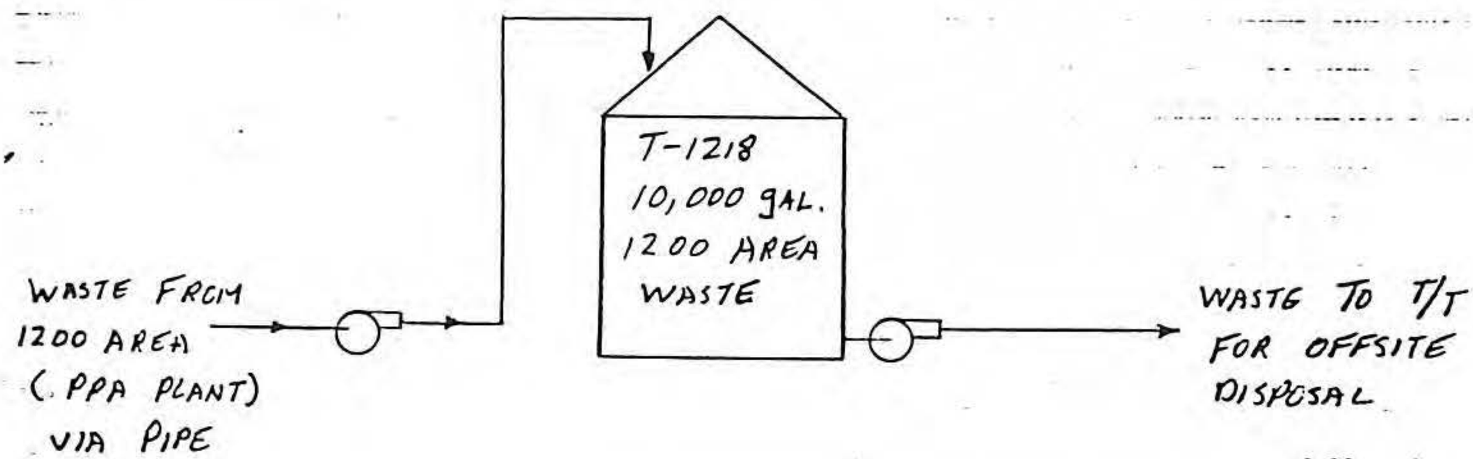
# ATTACHMENT "G"

## PROCESS FLOWSHEET T-105 AND T-107

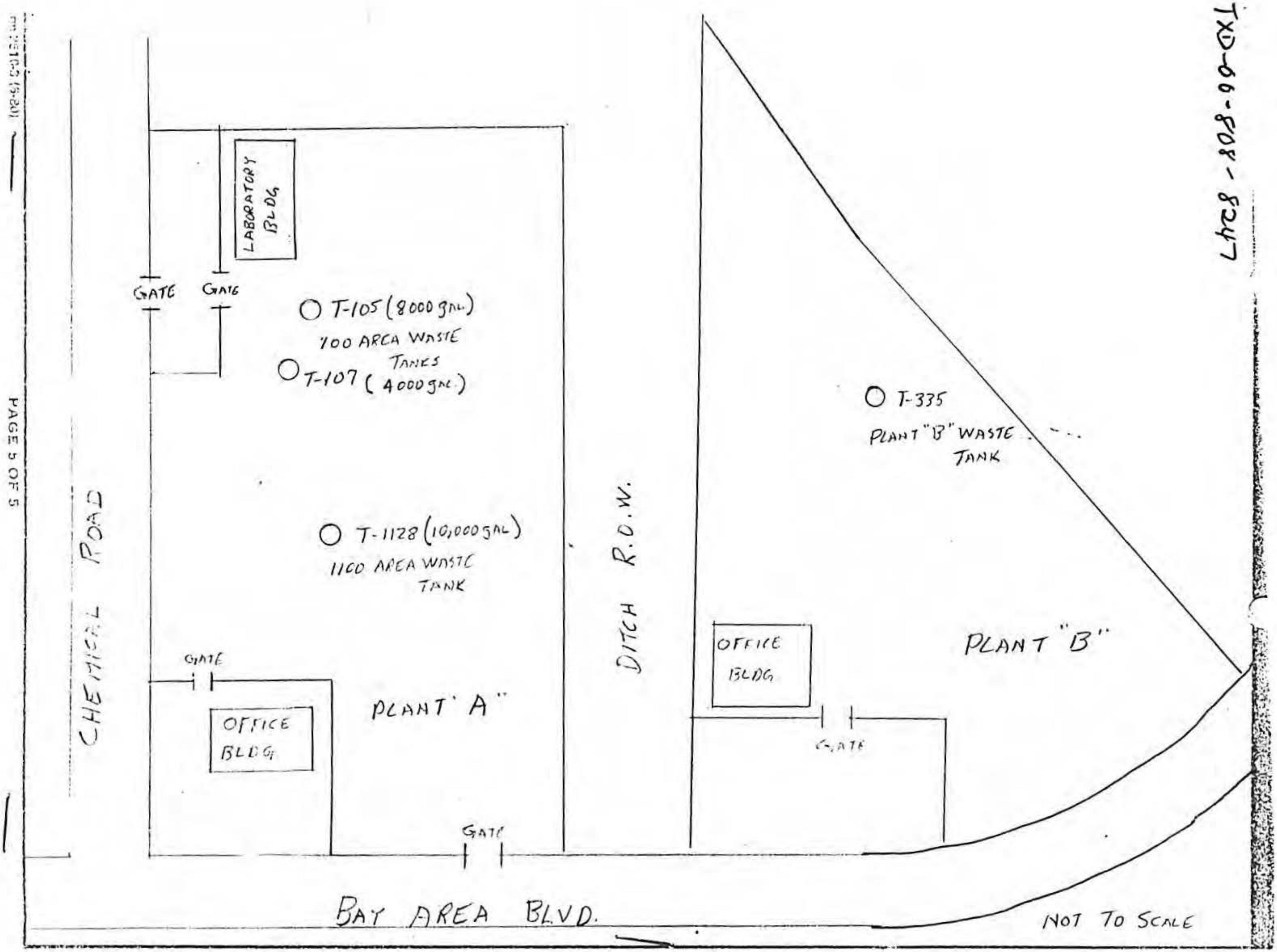


ATTACHMENT "G"

PROCESS FLOWSHEET T-1218



TXD-06-808-8247




PAGE 5 OF 5

Reference 7

## RECORD OF COMMUNICATION

Reference 7

TYPE: Telephone Call

**DATE**: 1-25-90

**TIME**: 2:50 p.m.

TO: Brenda Bowling
Biologist
Texas Parks & Wildlife Department
713-474-2811

**FROM**: Warren P. Mitchell CAC for WM
FIT Biologist
ICF Technology, Inc.
Dallas, Texas
214-744-1641

SUBJECT: The Sensitive Environments Near Taylor Bayou, Taylor Lake and Clear Lake

SUMMARY OF COMMUNICATION

In a telephone call with Brenda Bowling of the Texas Parks and Wildlife Department, the following information was given.

Taylor Bayou, Taylor Lake and Clear Lake do have sensitive environments. Each are state designated areas for the protection or maintenance of aquatic life. These areas are for the maintenance of young shrimp who stay here until they mature and migrate to spawn in the Galveston Bay area. Therefore, these areas are considered sensitive environments. The coastal line of Galveston Bay from LaPorte to Seabrook is not a designated area by the state for protection of aquatic life. This designation is usually for marshes and bayous.

CONCLUSIONS, ACTION TAKEN OR REQUIRED:

In conclusion, the three watersheds are protected by the state and are assigned a value of 50.

Reference 8

# RECORD OF COMMUNICATION

Reference 8

TYPE: Telephone Call    DATE: 1-25-90    TIME: 2:57 p.m.

TO: Steve Spencer
Biologist III
Texas Parks and Wildlife Department
713-474-2811

FROM: Warren P. Mitchell CAC for W.M.
FIT Biologist
ICF Technology, Inc.
Dallas, Texas
214-744-1641

SUBJECT: Determination of Where the Waste Water of the District is Dispersed from the Gulf Coast Waste Disposal Authority

SUMMARY OF COMMUNICATION

In a phone call with Steve Spencer of the Texas Parks and Wildlife Department, the following information was given.

The Gulf Coast Waste Disposal Authority (GCWDA) receives the process waste water from the various chemical plants in the Bayport Industrial District. The GCWDA received a permit from the Texas Water Commission (# 01054) to treat the process water from the various plants; this newly generated waste water is discharged by pipeline to the Bayport Channel and into the Galveston Bay. To the best of Mr. Spencer's knowledge there is no release into the Taylor Bayou. Taylor Bayou is approximately 2 - 3 feet deep.

CONCLUSIONS, ACTION TAKEN OR REQUIRED:

Concluded: The process waste water from Dixie Chemical does not go into Taylor Bayou.

Reference 9

## RECORD OF COMMUNICATION

Reference 9

TYPE: Telephone Call  **DATE:** 1-3-90  **TIME:** 1:45 p.m. CAC for W.M.

TO: Marsha Allen
Armand Bayou National Park
Pasadena, Texas
713-474-2551

**FROM:** Warren P. Mitchell
FIT Biologist
ICF Technology, Inc.
Dallas, Texas
214-744-1641

SUBJECT: Status of the Armand Bayou Nature Center

SUMMARY OF COMMUNICATION

In a phone call with Marsha Allen of the Armand Bayou Nature Center, the following information was given.

The park is a private non-profit area. It has 1,600 acres of woodlands, prairieland and some wetlands. The park contains Whitetail deer, raccoons and migratory birds.

It was originally farmland which was later sold to Friendswood Development and purchased by the present area's private owners. It has a Board of Directors; the chairperson is Emy Robinson. The director is Jim Larabee.

It has the unique distinction as the only bayou in the state not to be dredged or altered by man. It is part of the National Estuary Program.

CONCLUSIONS, ACTION TAKEN OR REQUIRED:

Since the bayou is part of the National Estuary Program, it can be assigned a maximum value of 100 under sensitive environments for the air pathway.

Reference 10

# RECORD OF COMMUNICATION

Reference 10

TYPE: Telephone Call | DATE: 1-3-90 | TIME: 2:50 p.m.

TO: Don Pitts
Texas Parks and Wildlife Department
Pasadena, Texas
713-474-2811

FROM: Warren P. Mitchell CAC For W.P.M.
FIT Biologist
ICF Technology, Inc.
Dallas, Texas
214-744-1641

SUBJECT: Use of the Taylor Bayou

SUMMARY OF COMMUNICATION

In a telephone call with Don Pitts of the Texas Parks and Wildlife Department, the following information was given.

The storm water canal that bisects the Dixie Chemical plant does receive treated discharge water, approved by the Coastal Water Authority, from Dixie Chemical. This canal is basically an intermittent ditch which flows into the Taylor Bayou into Taylor Lake, then into Clear Lake and then into the Gulf of Mexico.

The Taylor Bayou is a very sensitive area. It is a nursery area for shrimp, yet "trash fishing" is allowed, which are the fish not used for commercial use. Other recreation includes motorized boating, swimming and skiing. These applications include Taylor Lake to Clear Lake.

CONCLUSIONS, ACTION TAKEN OR REQUIRED:

Using this information, the Taylor Bayou, Taylor Lake and Clear Lake were concluded to be sensitive areas. The use of the storm water canal to where it is discharged was confirmed.

Reference 11

## RECORD OF COMMUNICATION



TYPE: Telephone Call | DATE: 1-2-90 | TIME: 3:10 p.m.

TO: Joyce Nelson
Chamber of Commerce
Pasadena, Texas
713-487-7871

FROM: Warren P. Mitchell C&C for W.M.
FIT Biologist
ICF Technology, Inc.
Dallas, Texas
214-744-1641

SUBJECT: Nearest Homes, Schools, Parks and Surface Water Bodies in the Pasadena Area

SUMMARY OF COMMUNICATION

In a telephone call with Joyce Nelson of the Pasadena Chamber of Commerce, the following information was given.

The nearest school is Clear Lake High School approximately 4 miles away.

The nearest multi-family homes are in Clear Lake near the local university approximately 4 miles away.

The nearest surface water is the Taylor Bayou. Ms. Nelson was not familiar with the use of it. Taylor Bayou is approximately ½ mile from the site.

The nearest park is the Armand Bayou which is a Nature Park, located a little over 2 miles from the site. It is used for recreation, canoeing, etc. and has a controlled entry.

CONCLUSIONS, ACTION TAKEN OR REQUIRED:

This information helped to determine the nearest household, park, surface water and the nearest school in the 4 mile radius of Dixie Chemical.

Reference 12

# RECORD OF COMMUNICATION

Reference 12

TYPE: Telephone Call    DATE: 12-29-89    TIME: 10:20 a.m.

TO:
Caroline Watkins
Personnel Department
Dixie Chemical Company
Pasadena, Texas
214-474-3271

FROM:
Warren P. Mitchell cte for W.M.
FIT Biologist
ICF Technology, Inc.
Dallas, Texas
214-744-1641

SUBJECT: The Number of Employees at Dixie Chemical Company

SUMMARY OF COMMUNICATION

In a telephone conversation with Caroline Watkins of Dixie Chemical Company the following information was given.

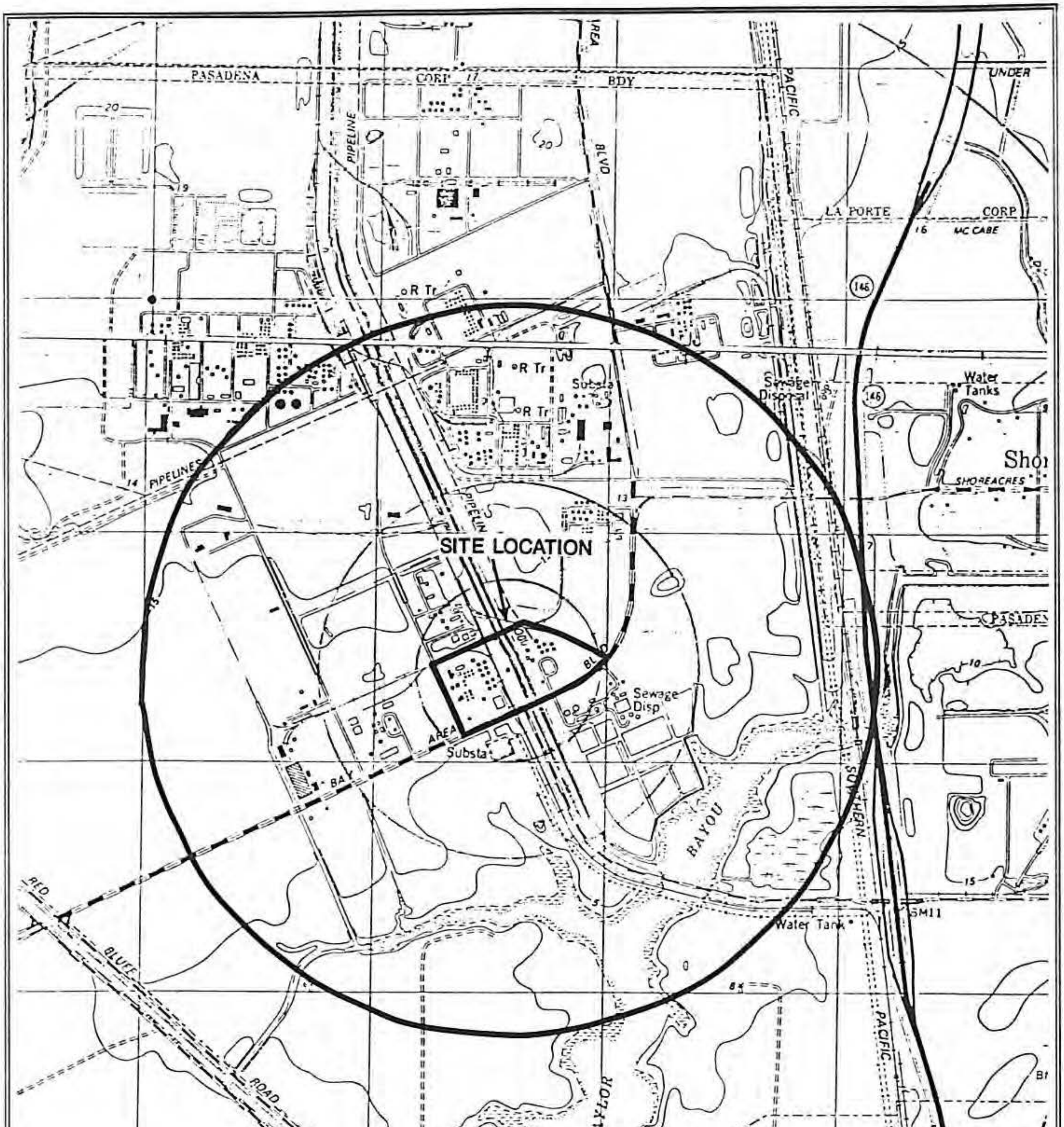
The total number of people employed at the Bayport Plant for Dixie Chemical is 130 people. This figure includes management and is current.

CONCLUSIONS, ACTION TAKEN OR REQUIRED:

The total number of employees at Dixie Chemical was determined to be 130.

**Reference 13**

ICF




N

0 2000FT

SCALE 1 : 24000

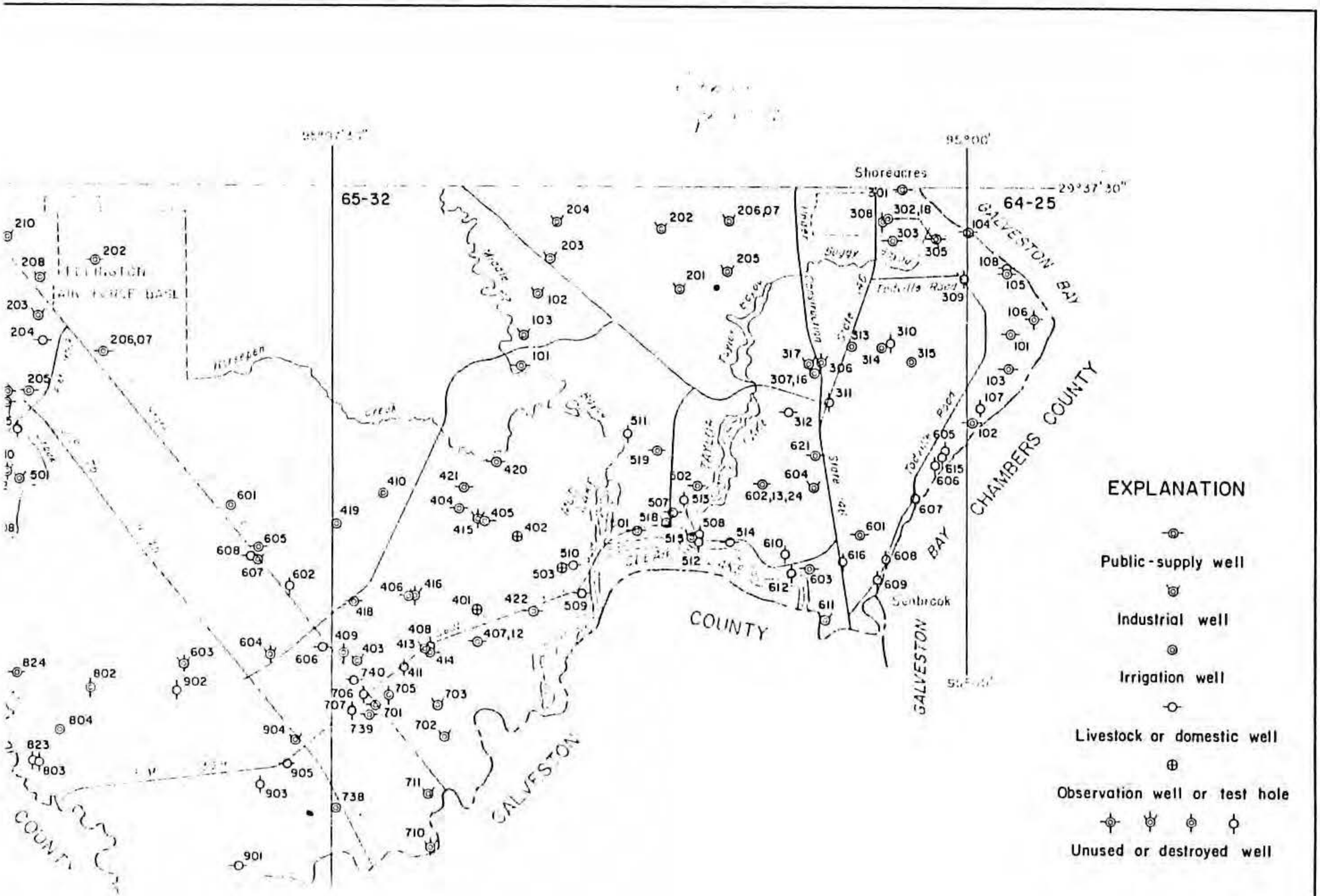
**Site Location Map**
**DIXIE CHEMICAL COMPANY**
**PASADENA, TX**
**TDD NO. F-6-8908-48**
**CERCLIS NO. TXD008088247**
**FIGURE 1**


QUADRANGLE LOCATION
LEAGUE CITY, TX
LAPORTE, TX
BAYCLIFF, TX
MORGANS POINT, TX

**Reference 14**

## RECORDS OF WELLS IN HARRIS COUNTY

## AREA 8



65-32
64-25
Shoreacres
29°37'30"
95°00'
ELLINGTON AIR FORCE BASE
GALVESTON BAY
CHAMBERS COUNTY
COUNTY
GALVESTON
BAY
Seabrook
EXPLANATION
Public-supply well
Industrial well
Irrigation well
Livestock or domestic well
Observation well or test hole
Unused or destroyed well

# THIS DOCUMENT CONTAINED CONFIDENTIAL INFORMATION WHICH WAS REFILED TO THE PRIVACY ACT/HEALTH CONFIDENTIAL (PC) PHASE/ACTIVITY

**DOC #** T824700032

**DATE:**

**TITLE:** Reference 14: Records of Wells in Harris County

Reference 15

## RECORD OF COMMUNICATION

Reference 15

TYPE: Telephone Call    DATE: 5-2-90    TIME: 10:40 a.m.

TO: Will Moberly
Biologist
Texas Parks and Wildlife Department
Clear Lake City Water Authority
713-474-2811

FROM: Pam Fetzer CAC for P.F.
FIT Geologist
ICF Technology, Inc.
Dallas, Texas
214-744-1641

SUBJECT: Public Water Source for Clear Lake City

SUMMARY OF COMMUNICATION

Mr. Moberly said that they purchase the majority of their water from Houston (Lake Houston). They service 42,000 people with 90% surface water and 10% ground water. They have six wells that are screened in the Lower Chicot Aquifer. The well locations are as follows:

1) 17507 El Camino Real . . . . . . . . south end of town
2) 600 Eldorado . . . . . . . . . . . . . east end of town off Highway 3
3) 4231 Manor Field . . . . . . . . . . Clear Lake forest
4) 1600 Diane (golf course) . . . . . Taylor Lake, south of town
5) 900 Barry Boulevard . . . . . . . . south of Well #2 off Highway 3
6) 1700 Racida (golf course) . . . . . east of Well #4 (irrigation)

The wells are screened at 200 to 300 feet. The static water level is ± 190 feet. The water is used to supplement the surface water, particularly when the demand is high.

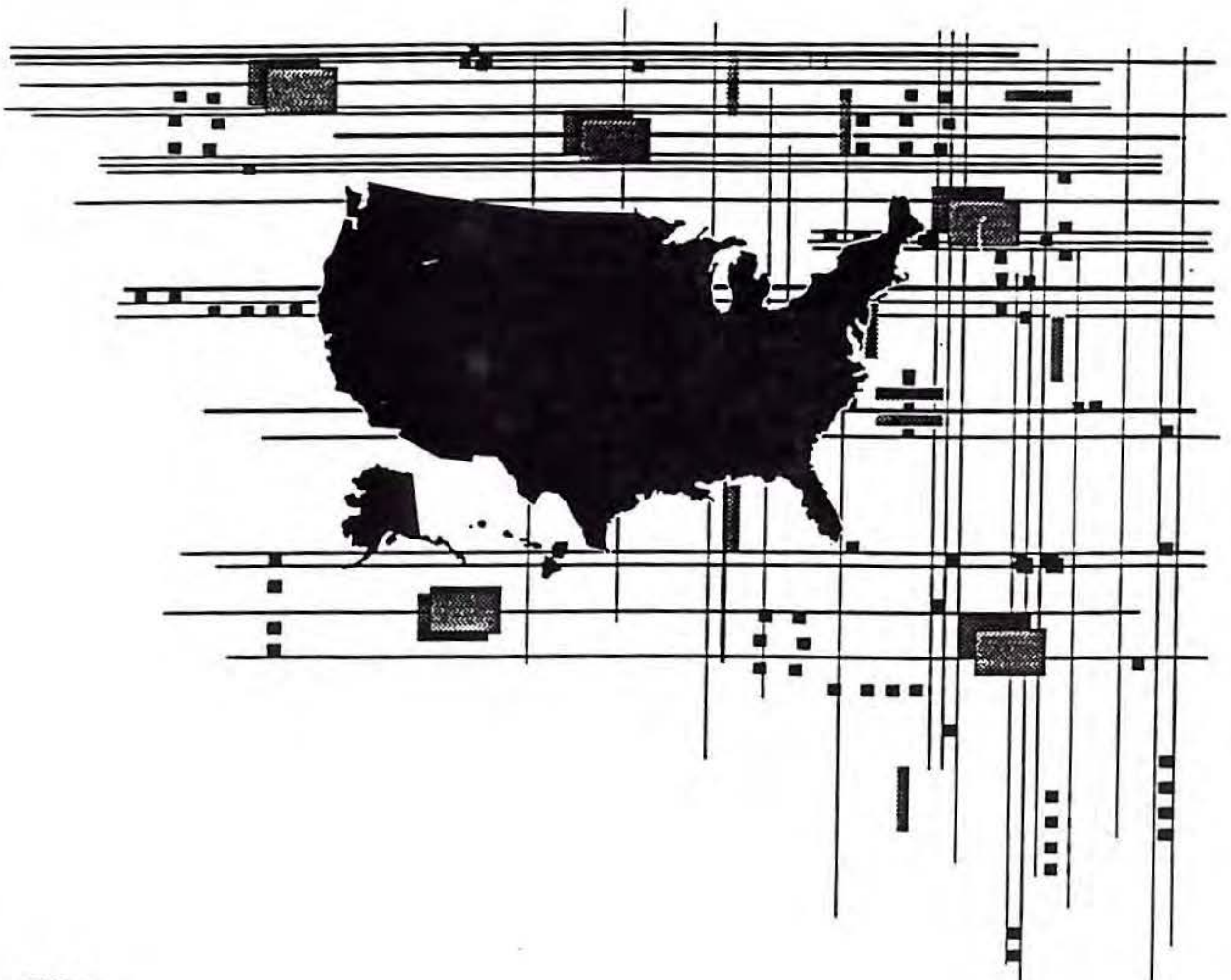
**Reference 16**

CURRENT POPULATION REPORTS

**Special Studies**

Series P-23, No. 156

# Estimates of Households, for Counties: July 1,1985



U.S. Department of Commerce
BUREAU OF THE CENSUS

## Table 1. Estimates of Households, for Counties: July 1, 1985—Continued

(A dash (-) represents zero or rounds to zero. Estimates are consistent with special censuses since 1980. Corrections to 1980 census counts are not included. See text concerning rounding and average population per household)

| State and county | Households: July 1, 1985 (estimate) | Households: April 1, 1980 (census) | Households: Change, 1980-85: Number | Households: Change, 1980-85: Percent | Average population per household: July 1, 1985 (estimate) | Average population per household: April 1, 1980 (census) | Population: July 1, 1985 (estimate) | Population: April 1, 1980 (census) | Population: Change, 1980-85: Number | Population: Change, 1980-85: Percent |
|---|---|---|---|---|---|---|---|---|---|---|
| **Arizona—Continued** | | | | | | | | | | |
| Graham | 6,800 | 6,587 | 200 | 3.0 | 3.22 | 3.25 | 23,800 | 22,862 | 900 | 3.9 |
| Greenlee | 2,900 | 3,607 | -700 | -20.1 | 3.14 | 3.16 | 9,100 | 11,406 | -2,300 | -20.5 |
| LaPaz | 5,500 | 4,658 | 900 | 18.3 | 2.48 | 2.69 | 13,700 | 12,557 | 1,200 | 9.3 |
| Maricopa | 692,100 | 544,759 | 147,300 | 27.0 | 2.58 | 2.73 | 1,816,700 | 1,509,052 | 307,600 | 20.4 |
| Mohave | 28,300 | 21,110 | 7,200 | 34.0 | 2.51 | 2.63 | 71,600 | 55,865 | 15,700 | 28.1 |
| Navajo | 19,700 | 18,301 | 1,400 | 7.8 | 3.58 | 3.69 | 70,700 | 67,629 | 3,100 | 4.5 |
| Pima | 230,500 | 195,459 | 35,000 | 17.9 | 2.47 | 2.66 | 585,000 | 531,443 | 53,500 | 10.1 |
| Pinal | 33,100 | 28,411 | 4,700 | 16.4 | 2.85 | 3.08 | 98,000 | 90,918 | 7,100 | 7.8 |
| Santa Cruz | 6,600 | 5,999 | 600 | 10.0 | 3.38 | 3.40 | 22,400 | 20,459 | 1,900 | 9.4 |
| Yavapai | 34,100 | 26,599 | 7,500 | 28.3 | 2.39 | 2.50 | 83,400 | 68,145 | 15,300 | 22.4 |
| Yuma | 28,600 | 25,190 | 3,400 | 13.6 | 2.87 | 2.98 | 84,800 | 77,997 | 6,800 | 8.7 |
| **Arkansas** | 876,000 | 816,065 | 60,000 | 7.3 | 2.64 | 2.74 | 2,360,000 | 2,286,435 | 73,000 | 3.2 |
| Arkansas | 9,100 | 8,909 | 200 | 1.8 | 2.56 | 2.68 | 23,500 | 24,175 | -600 | -2.7 |
| Ashley | 9,700 | 9,061 | 700 | 7.4 | 2.71 | 2.90 | 26,700 | 26,538 | 200 | 0.6 |
| Baxter | 12,600 | 11,181 | 1,500 | 13.1 | 2.33 | 2.43 | 29,800 | 27,409 | 2,400 | 8.7 |
| Benton | 32,900 | 28,622 | 4,200 | 14.8 | 2.59 | 2.68 | 86,700 | 78,115 | 8,600 | 11.0 |
| Boone | 11,100 | 9,781 | 1,300 | 13.1 | 2.47 | 2.63 | 27,700 | 26,067 | 1,700 | 6.4 |
| Bradley | 5,000 | 5,040 | - | -0.5 | 2.62 | 2.69 | 13,400 | 13,803 | -400 | -3.1 |
| Calhoun | 2,200 | 2,121 | 100 | 3.9 | 2.68 | 2.76 | 6,100 | 6,079 | 100 | 0.9 |
| Carroll | 7,300 | 6,431 | 900 | 13.9 | 2.41 | 2.51 | 17,700 | 16,203 | 1,500 | 9.4 |
| Chicot | 6,100 | 5,993 | 100 | 1.1 | 2.88 | 2.96 | 17,500 | 17,793 | -300 | -1.6 |
| Clark | 8,200 | 8,134 | 100 | 1.3 | 2.53 | 2.59 | 22,800 | 23,326 | -500 | -2.2 |
| Clay | 8,000 | 7,911 | 100 | 0.9 | 2.44 | 2.58 | 19,700 | 20,616 | -900 | -4.4 |
| Cleburne | 7,600 | 6,405 | 1,100 | 17.9 | 2.52 | 2.62 | 19,200 | 16,909 | 2,200 | 13.3 |
| Cleveland | 2,800 | 2,769 | 100 | 2.0 | 2.85 | 2.82 | 8,100 | 7,868 | 200 | 3.2 |
| Columbia | 10,000 | 9,535 | 500 | 5.3 | 2.61 | 2.69 | 27,200 | 26,644 | 600 | 2.2 |
| Conway | 6,900 | 6,800 | 100 | 1.4 | 2.76 | 2.83 | 19,300 | 19,505 | -200 | -1.2 |
| Craighead | 23,600 | 22,334 | 1,300 | 5.7 | 2.57 | 2.70 | 63,100 | 63,239 | -100 | -0.2 |
| Crawford | 14,600 | 12,566 | 2,000 | 15.9 | 2.76 | 2.90 | 40,600 | 36,892 | 3,700 | 10.1 |
| Crittenden | 16,400 | 15,701 | 700 | 4.2 | 3.05 | 3.14 | 50,200 | 49,499 | 700 | 1.4 |
| Cross | 7,000 | 6,631 | 300 | 5.3 | 2.90 | 3.04 | 20,500 | 20,434 | 100 | 0.5 |
| Dallas | 3,800 | 3,735 | - | 0.5 | 2.74 | 2.77 | 10,500 | 10,515 | -100 | -0.6 |
| Desha | 6,700 | 6,640 | - | 0.4 | 2.89 | 2.95 | 19,500 | 19,760 | -300 | -1.4 |
| Drew | 6,400 | 6,200 | 200 | 4.0 | 2.70 | 2.78 | 18,200 | 17,910 | 200 | 1.4 |
| Faulkner | 18,200 | 15,489 | 2,700 | 17.3 | 2.64 | 2.76 | 51,300 | 46,192 | 5,200 | 11.2 |
| Franklin | 5,700 | 5,164 | 500 | 9.8 | 2.63 | 2.74 | 15,500 | 14,705 | 800 | 5.3 |
| Fulton | 4,000 | 3,765 | 200 | 5.6 | 2.55 | 2.62 | 10,300 | 9,975 | 300 | 3.1 |
| Garland | 31,300 | 28,171 | 3,200 | 11.2 | 2.33 | 2.45 | 74,600 | 70,531 | 4,100 | 5.8 |
| Grant | 4,800 | 4,504 | 300 | 7.2 | 2.73 | 2.86 | 13,300 | 13,008 | 300 | 2.0 |
| Greene | 11,800 | 11,228 | 500 | 4.7 | 2.66 | 2.71 | 31,500 | 30,744 | 800 | 2.6 |
| Hempstead | 8,600 | 8,578 | 100 | 0.7 | 2.67 | 2.73 | 23,300 | 23,635 | -300 | -1.4 |
| Hot Spring | 10,100 | 9,683 | 500 | 4.6 | 2.67 | 2.75 | 27,300 | 26,819 | 400 | 1.7 |
| Howard | 4,900 | 4,818 | 100 | 1.4 | 2.71 | 2.73 | 13,500 | 13,459 | 100 | 0.5 |
| Independence | 11,600 | 10,901 | 700 | 6.8 | 2.72 | 2.72 | 32,100 | 30,147 | 2,000 | 6.6 |
| Izard | 4,400 | 4,284 | 100 | 3.0 | 2.45 | 2.48 | 11,000 | 10,768 | 200 | 1.8 |
| Jackson | 7,900 | 7,786 | 100 | 1.6 | 2.64 | 2.75 | 21,100 | 21,646 | -600 | -2.6 |
| Jefferson | 31,700 | 30,588 | 1,100 | 3.5 | 2.75 | 2.87 | 90,200 | 90,718 | -500 | -0.5 |
| Johnson | 6,900 | 6,395 | 500 | 7.2 | 2.63 | 2.66 | 18,400 | 17,423 | 1,000 | 5.8 |
| Lafayette | 3,600 | 3,587 | - | -0.9 | 2.75 | 2.82 | 9,900 | 10,213 | -300 | -3.2 |
| Lawrence | 7,100 | 6,797 | 300 | 5.0 | 2.52 | 2.66 | 18,300 | 18,447 | -200 | -1.0 |
| Lee | 5,300 | 4,942 | 400 | 8.2 | 2.83 | 3.11 | 15,300 | 15,539 | -200 | -1.5 |
| Lincoln | 3,800 | 3,918 | -100 | -2.5 | 2.92 | 2.97 | 13,100 | 13,369 | -200 | -1.7 |

## Table 1. Estimates of Households, for Counties: July 1, 1985—Continued

(A dash (-) represents zero or rounds to zero. Estimates are consistent with special censuses since 1980. Corrections to 1980 census counts are not included. See text concerning rounding and average population per household)

| State and county | Households | | | | Average population per household | | Population | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | July 1, 1985 (estimate) | April 1, 1980 (census) | Change, 1980-85 Number | Change, 1980-85 Percent | July 1, 1985 (estimate) | April 1, 1980 (census) | July 1, 1985 (estimate) | April 1, 1980 (census) | Change, 1980-85 Number | Change, 1980-85 Percent |
| **Arkansas—Continued** | | | | | | | | | | |
| Little River | 5,000 | 4,735 | 300 | 6.3 | 2.79 | 2.92 | 14,200 | 13,952 | 200 | 1.7 |
| Logan | 7,500 | 7,059 | 500 | 6.5 | 2.67 | 2.75 | 20,800 | 20,144 | 700 | 3.4 |
| Lonoke | 13,000 | 11,408 | 1,600 | 13.6 | 2.83 | 2.98 | 37,300 | 34,518 | 2,800 | 8.1 |
| Madison | 4,400 | 4,094 | 300 | 6.6 | 2.72 | 2.76 | 11,900 | 11,373 | 600 | 4.8 |
| Marion | 4,700 | 4,311 | 400 | 8.5 | 2.63 | 2.61 | 12,400 | 11,334 | 1,100 | 9.3 |
| Miller | 14,300 | 13,476 | 900 | 6.4 | 2.67 | 2.77 | 38,700 | 37,766 | 1,000 | 2.6 |
| Mississippi | 20,600 | 19,757 | 900 | 4.4 | 2.80 | 2.95 | 58,800 | 59,517 | -700 | -1.2 |
| Monroe | 4,900 | 4,920 | - | -0.7 | 2.67 | 2.83 | 13,100 | 14,052 | -900 | -6.5 |
| Montgomery | 3,000 | 2,922 | 100 | 3.0 | 2.61 | 2.64 | 7,900 | 7,771 | 100 | 1.8 |
| Nevada | 3,900 | 3,980 | -100 | -2.0 | 2.75 | 2.74 | 10,900 | 11,097 | -200 | -1.5 |
| Newton | 2,900 | 2,718 | 200 | 7.9 | 2.76 | 2.84 | 8,100 | 7,756 | 400 | 5.0 |
| Ouachita | 12,400 | 11,198 | 1,200 | 10.4 | 2.68 | 2.70 | 33,500 | 30,541 | 2,900 | 9.6 |
| Perry | 2,900 | 2,564 | 300 | 12.8 | 2.69 | 2.82 | 7,800 | 7,266 | 600 | 7.6 |
| Phillips | 11,400 | 11,434 | - | -0.3 | 2.93 | 3.01 | 33,600 | 34,772 | -1,100 | -3.3 |
| Pike | 3,900 | 3,839 | 100 | 2.6 | 2.54 | 2.67 | 10,100 | 10,373 | -200 | -2.2 |
| Poinsett | 9,800 | 9,465 | 300 | 3.2 | 2.65 | 2.84 | 26,000 | 27,032 | -1,000 | -3.6 |
| Polk | 6,600 | 6,318 | 300 | 5.2 | 2.57 | 2.67 | 17,300 | 17,007 | 300 | 1.5 |
| Pope | 15,500 | 13,615 | 1,900 | 13.6 | 2.66 | 2.76 | 42,600 | 39,021 | 3,500 | 9.1 |
| Prairie | 3,700 | 3,658 | - | 0.1 | 2.74 | 2.77 | 10,000 | 10,140 | -100 | -1.1 |
| Pulaski | 134,200 | 124,516 | 9,700 | 7.8 | 2.58 | 2.68 | 353,700 | 340,613 | 13,100 | 3.8 |
| Randolph | 6,000 | 6,079 | -100 | -0.9 | 2.76 | 2.75 | 16,700 | 16,834 | -100 | -0.8 |
| St. Francis | 10,600 | 9,930 | 700 | 6.8 | 2.94 | 3.09 | 31,400 | 30,858 | 500 | 1.7 |
| Saline | 19,500 | 17,572 | 2,000 | 11.2 | 2.82 | 2.93 | 56,700 | 53,161 | 3,600 | 6.7 |
| Scott | 3,900 | 3,534 | 300 | 9.8 | 2.60 | 2.72 | 10,200 | 9,685 | 500 | 5.0 |
| Searcy | 3,400 | 3,257 | 100 | 4.0 | 2.60 | 2.70 | 8,900 | 8,847 | - | 0.2 |
| Sebastian | 38,400 | 35,803 | 2,600 | 7.2 | 2.53 | 2.62 | 98,600 | 95,172 | 3,400 | 3.6 |
| Sevier | 5,300 | 5,057 | 300 | 5.0 | 2.67 | 2.75 | 14,400 | 14,060 | 300 | 2.1 |
| Sharp | 6,100 | 5,642 | 500 | 9.0 | 2.49 | 2.58 | 15,400 | 14,607 | 800 | 5.5 |
| Stone | 3,800 | 3,280 | 600 | 17.2 | 2.54 | 2.73 | 9,800 | 9,022 | 800 | 8.9 |
| Union | 19,000 | 18,080 | 900 | 5.2 | 2.56 | 2.65 | 49,300 | 48,573 | 700 | 1.5 |
| Van Buren | 5,900 | 5,018 | 800 | 16.8 | 2.53 | 2.65 | 14,900 | 13,357 | 1,500 | 11.3 |
| Washington | 40,000 | 36,072 | 3,900 | 10.9 | 2.52 | 2.63 | 105,700 | 100,494 | 5,200 | 5.1 |
| White | 18,800 | 17,423 | 1,400 | 7.9 | 2.66 | 2.76 | 52,300 | 50,835 | 1,500 | 2.9 |
| Woodruff | 4,000 | 4,014 | - | -1.1 | 2.67 | 2.78 | 10,700 | 11,222 | -500 | -4.8 |
| Yell | 6,600 | 6,219 | 400 | 6.5 | 2.61 | 2.70 | 17,600 | 17,026 | 600 | 3.3 |
| **California** | 9,616,000 | 8,629,866 | 987,000 | 11.4 | 2.67 | 2.68 | 26,358,000 | 23,667,902 | 2,690,000 | 11.4 |
| Alameda | 463,100 | 426,092 | 37,000 | 8.7 | 2.50 | 2.53 | 1,194,900 | 1,105,379 | 89,500 | 8.1 |
| Alpine | 400 | 386 | 100 | 15.5 | 2.62 | 2.84 | 1,200 | 1,097 | 100 | 7.9 |
| Amador | 9,100 | 7,468 | 1,600 | 21.8 | 2.45 | 2.49 | 23,200 | 19,314 | 3,900 | 20.1 |
| Butte | 64,700 | 56,904 | 7,800 | 13.7 | 2.44 | 2.46 | 162,400 | 143,851 | 18,600 | 12.9 |
| Calaveras | 10,400 | 8,004 | 2,400 | 30.4 | 2.50 | 2.54 | 26,600 | 20,710 | 5,900 | 28.3 |
| Colusa | 5,300 | 4,690 | 600 | 12.3 | 2.74 | 2.69 | 14,600 | 12,791 | 1,800 | 14.0 |
| Contra Costa | 267,400 | 241,534 | 25,900 | 10.7 | 2.64 | 2.69 | 715,200 | 656,380 | 58,800 | 9.0 |
| Del Norte | 7,100 | 6,791 | 300 | 4.4 | 2.59 | 2.64 | 18,700 | 18,217 | 400 | 2.4 |
| El Dorado | 39,900 | 32,505 | 7,400 | 22.8 | 2.59 | 2.62 | 103,900 | 85,812 | 18,100 | 21.1 |
| Fresno | 198,400 | 178,506 | 19,900 | 11.1 | 2.85 | 2.83 | 576,000 | 514,621 | 61,400 | 11.9 |
| Glenn | 8,300 | 7,707 | 600 | 7.7 | 2.74 | 2.75 | 23,000 | 21,350 | 1,600 | 7.6 |
| Humboldt | 42,700 | 41,565 | 1,100 | 2.6 | 2.56 | 2.55 | 111,900 | 108,514 | 3,400 | 3.1 |
| Imperial | 32,700 | 28,157 | 4,500 | 16.0 | 3.21 | 3.24 | 105,800 | 92,110 | 13,700 | 14.9 |
| Inyo | 7,500 | 7,214 | 300 | 4.0 | 2.40 | 2.45 | 18,200 | 17,895 | 300 | 1.8 |
| Kern | 162,900 | 139,811 | 23,100 | 16.5 | 2.88 | 2.82 | 479,600 | 403,089 | 76,500 | 19.0 |
| Kings | 26,400 | 23,499 | 2,900 | 12.5 | 3.10 | 3.04 | 84,900 | 73,738 | 11,200 | 15.1 |
| Lake | 19,700 | 15,192 | 4,500 | 29.9 | 2.39 | 2.36 | 47,700 | 36,366 | 11,300 | 31.2 |
| Lassen | 7,900 | 7,400 | 500 | 7.3 | 2.74 | 2.70 | 24,300 | 21,661 | 2,700 | 12.4 |
| Los Angeles | 2,920,000 | 2,730,469 | 189,500 | 6.9 | 2.73 | 2.69 | 8,130,800 | 7,477,503 | 653,300 | 8.7 |

## Table 1. Estimates of Households, for Counties: July 1, 1985—Continued

(A dash (-) represents zero or rounds to zero. Estimates are consistent with special censuses since 1980. Corrections to 1980 census counts are not included. See text concerning rounding and average population per household)

| State and county | Households | | | | Average population per household | | Population | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | July 1, 1985 (estimate) | April 1, 1980 (census) | Change, 1980-85 Number | Change, 1980-85 Percent | July 1, 1985 (estimate) | April 1, 1980 (census) | July 1, 1985 (estimate) | April 1, 1980 (census) | Change, 1980-85 Number | Change, 1980-85 Percent |
| **Kentucky—Continued** | | | | | | | | | | |
| Meade | 7,200 | 7,165 | 100 | 0.8 | 3.20 | 3.18 | 23,200 | 22,854 | 300 | 1.4 |
| Menifee | 1,800 | 1,670 | 100 | 6.6 | 2.92 | 3.02 | 5,300 | 5,117 | 100 | 2.9 |
| Mercer | 6,900 | 6,810 | 100 | 1.4 | 2.65 | 2.77 | 19,100 | 19,011 | - | 0.2 |
| Metcalfe | 3,500 | 3,267 | 200 | 6.3 | 2.81 | 2.88 | 9,800 | 9,484 | 400 | 3.7 |
| Monroe | 4,600 | 4,418 | 200 | 4.8 | 2.61 | 2.77 | 12,200 | 12,353 | -100 | -1.0 |
| Montgomery | 7,200 | 6,884 | 300 | 4.1 | 2.84 | 2.89 | 20,500 | 20,046 | 500 | 2.5 |
| Morgan | 4,100 | 3,996 | 100 | 1.8 | 2.93 | 2.99 | 12,000 | 12,103 | -100 | -0.4 |
| Muhlenberg | 11,700 | 11,120 | 600 | 5.5 | 2.66 | 2.83 | 32,000 | 32,238 | -300 | -0.8 |
| Nelson | 9,700 | 8,650 | 1,100 | 12.1 | 2.97 | 3.13 | 29,300 | 27,584 | 1,800 | 6.4 |
| Nicholas | 2,700 | 2,597 | 100 | 2.7 | 2.67 | 2.73 | 7,200 | 7,157 | - | 0.2 |
| Ohio | 7,700 | 7,585 | 100 | 1.8 | 2.76 | 2.83 | 21,600 | 21,765 | -200 | -0.8 |
| Oldham | 8,700 | 8,026 | 700 | 8.9 | 3.09 | 3.15 | 29,800 | 27,795 | 2,000 | 7.2 |
| Owen | 3,400 | 3,193 | 200 | 6.1 | 2.75 | 2.77 | 9,400 | 8,924 | 500 | 5.3 |
| Owsley | 1,900 | 1,890 | - | 0.9 | 2.91 | 3.02 | 5,600 | 5,709 | -100 | -2.5 |
| Pendleton | 3,700 | 3,734 | -100 | -1.3 | 2.95 | 2.92 | 10,900 | 10,989 | - | -0.4 |
| Perry | 11,500 | 10,573 | 1,000 | 9.1 | 3.00 | 3.17 | 34,800 | 33,763 | 1,000 | 3.1 |
| Pike | 27,500 | 26,393 | 1,100 | 4.2 | 3.00 | 3.06 | 83,000 | 81,123 | 1,900 | 2.3 |
| Powell | 3,900 | 3,518 | 400 | 10.6 | 3.04 | 3.12 | 12,000 | 11,101 | 900 | 7.8 |
| Pulaski | 17,800 | 16,126 | 1,700 | 10.3 | 2.68 | 2.79 | 48,600 | 45,803 | 2,800 | 6.2 |
| Robertson | 800 | 808 | - | -1.4 | 2.83 | 2.80 | 2,300 | 2,265 | - | -0.4 |
| Rockcastle | 5,200 | 4,729 | 500 | 10.6 | 2.78 | 2.94 | 14,600 | 13,973 | 600 | 4.5 |
| Rowan | 6,400 | 5,952 | 500 | 8.0 | 2.60 | 2.72 | 19,300 | 19,049 | 200 | 1.2 |
| Russell | 5,500 | 4,935 | 600 | 11.6 | 2.71 | 2.76 | 15,000 | 13,708 | 1,300 | 9.7 |
| Scott | 7,700 | 7,268 | 400 | 5.5 | 2.74 | 2.86 | 21,900 | 21,813 | 100 | 0.5 |
| Shelby | 8,500 | 7,859 | 600 | 7.6 | 2.74 | 2.86 | 24,000 | 23,328 | 600 | 2.8 |
| Simpson | 5,500 | 5,224 | 200 | 4.6 | 2.74 | 2.79 | 15,100 | 14,673 | 400 | 2.8 |
| Spencer | 2,200 | 2,026 | 200 | 10.5 | 2.76 | 2.93 | 6,200 | 5,929 | 200 | 4.1 |
| Taylor | 8,100 | 7,559 | 500 | 6.7 | 2.68 | 2.74 | 22,000 | 21,178 | 800 | 3.9 |
| Todd | 3,900 | 4,133 | -300 | -6.7 | 2.78 | 2.85 | 10,800 | 11,874 | -1,000 | -8.8 |
| Trigg | 3,600 | 3,360 | 300 | 8.2 | 2.63 | 2.75 | 9,700 | 9,384 | 300 | 3.4 |
| Trimble | 2,200 | 2,124 | - | 1.9 | 2.84 | 2.91 | 6,200 | 6,253 | - | -0.6 |
| Union | 5,800 | 5,399 | 400 | 8.1 | 2.64 | 2.86 | 17,800 | 17,821 | - | -0.2 |
| Warren | 30,100 | 24,833 | 5,200 | 21.1 | 2.59 | 2.67 | 82,000 | 71,828 | 10,200 | 14.2 |
| Washington | 3,400 | 3,482 | -100 | -2.8 | 2.96 | 3.02 | 10,300 | 10,764 | -500 | -4.7 |
| Wayne | 6,100 | 5,817 | 300 | 5.1 | 2.86 | 2.90 | 17,700 | 17,022 | 700 | 3.8 |
| Webster | 5,600 | 5,415 | 200 | 3.2 | 2.63 | 2.71 | 14,900 | 14,832 | - | 0.3 |
| Whitley | 12,600 | 11,338 | 1,300 | 11.0 | 2.74 | 2.86 | 35,500 | 33,396 | 2,100 | 6.4 |
| Wolfe | 2,500 | 2,282 | 200 | 10.6 | 2.76 | 2.89 | 7,100 | 6,698 | 400 | 5.7 |
| Woodford | 6,700 | 5,947 | 800 | 12.9 | 2.73 | 2.93 | 18,700 | 17,778 | 900 | 5.2 |
| **Louisiana** | 1,557,000 | 1,411,788 | 145,000 | 10.3 | 2.82 | 2.91 | 4,486,000 | 4,205,900 | 280,000 | 6.7 |
| Acadia Parish | 19,400 | 18,117 | 1,300 | 7.0 | 3.04 | 3.08 | 59,600 | 56,427 | 3,100 | 5.6 |
| Allen Parish | 7,500 | 7,272 | 200 | 3.3 | 2.84 | 2.92 | 21,500 | 21,390 | 100 | 0.6 |
| Ascension Parish | 18,800 | 15,494 | 3,300 | 21.1 | 3.07 | 3.21 | 58,000 | 50,068 | 7,900 | 15.8 |
| Assumption Parish | 7,200 | 6,479 | 800 | 11.7 | 3.24 | 3.41 | 23,500 | 22,084 | 1,400 | 6.3 |
| Avoyelles Parish | 14,400 | 13,544 | 900 | 6.6 | 2.93 | 2.99 | 43,200 | 41,393 | 1,900 | 4.5 |
| Beauregard Parish | 10,700 | 9,507 | 1,200 | 12.3 | 2.94 | 3.01 | 32,500 | 29,692 | 2,900 | 9.6 |
| Bienville Parish | 6,100 | 5,849 | 300 | 4.3 | 2.74 | 2.79 | 16,800 | 16,387 | 400 | 2.5 |
| Bossier Parish | 31,200 | 26,677 | 4,500 | 16.8 | 2.82 | 2.94 | 90,500 | 80,721 | 9,800 | 12.2 |
| Caddo Parish | 100,800 | 90,714 | 10,100 | 11.1 | 2.66 | 2.75 | 272,100 | 252,358 | 19,700 | 7.8 |
| Calcasieu Parish | 60,200 | 56,395 | 3,800 | 6.7 | 2.85 | 2.93 | 174,300 | 167,223 | 7,000 | 4.2 |
| Caldwell Parish | 4,100 | 3,881 | 200 | 4.7 | 2.76 | 2.73 | 11,400 | 10,761 | 600 | 5.8 |
| Cameron Parish | 3,200 | 3,020 | 200 | 6.5 | 3.07 | 3.09 | 9,900 | 9,336 | 600 | 5.9 |
| Catahoula Parish | 4,200 | 4,085 | 100 | 2.4 | 3.01 | 2.97 | 12,700 | 12,287 | 500 | 3.7 |
| Claiborne Parish | 6,400 | 6,105 | 300 | 5.5 | 2.75 | 2.78 | 18,400 | 17,095 | 1,300 | 7.8 |
| Concordia Parish | 8,100 | 7,578 | 500 | 6.7 | 2.91 | 3.01 | 23,700 | 22,981 | 700 | 3.2 |

## Table 1. Estimates of Households, for Counties: July 1, 1985—Continued

(A dash (-) represents zero or rounds to zero. Estimates are consistent with special censuses since 1980. Corrections to 1980 census counts are not included. See text concerning rounding and average population per household)

| State and county | Households: July 1, 1985 (estimate) | Households: April 1, 1980 (census) | Households: Change, 1980-85: Number | Households: Change, 1980-85: Percent | Average population per household: July 1, 1985 (estimate) | Average population per household: April 1, 1980 (census) | Population: July 1, 1985 (estimate) | Population: April 1, 1980 (census) | Population: Change, 1980-85: Number | Population: Change, 1980-85: Percent |
|---|---|---|---|---|---|---|---|---|---|---|
| **Louisiana—Continued** | | | | | | | | | | |
| De Soto Parish | 9,900 | 8,956 | 900 | 10.0 | 2.78 | 2.85 | 27,600 | 25,727 | 1,900 | 7.3 |
| East Baton Rouge Parish | 138,200 | 124,346 | 13,900 | 11.2 | 2.75 | 2.84 | 392,300 | 366,191 | 26,100 | 7.1 |
| East Carroll Parish | 3,500 | 3,615 | -100 | -1.9 | 3.12 | 3.20 | 11,200 | 11,772 | -500 | -4.5 |
| East Feliciana Parish | 5,700 | 5,078 | 600 | 11.5 | 3.21 | 3.29 | 20,400 | 19,015 | 1,400 | 7.4 |
| Evangeline Parish | 12,100 | 11,249 | 800 | 7.3 | 2.89 | 2.94 | 35,300 | 33,343 | 1,900 | 5.7 |
| Franklin Parish | 8,200 | 8,075 | 200 | 1.9 | 2.90 | 2.94 | 24,300 | 24,141 | 100 | 0.6 |
| Grant Parish | 6,100 | 5,770 | 400 | 6.5 | 2.92 | 2.87 | 18,100 | 16,703 | 1,400 | 8.2 |
| Iberia Parish | 22,200 | 19,915 | 2,300 | 11.6 | 3.07 | 3.18 | 68,600 | 63,752 | 4,900 | 7.6 |
| Iberville Parish | 10,200 | 9,634 | 600 | 5.9 | 3.10 | 3.22 | 33,400 | 32,159 | 1,300 | 4.0 |
| Jackson Parish | 6,300 | 6,101 | 200 | 2.7 | 2.80 | 2.79 | 17,800 | 17,321 | 500 | 2.9 |
| Jefferson Parish | 173,700 | 155,685 | 18,100 | 11.6 | 2.74 | 2.90 | 478,500 | 454,592 | 23,900 | 5.3 |
| Jefferson Davis Parish | 11,300 | 10,392 | 900 | 8.3 | 2.93 | 3.06 | 33,300 | 32,168 | 1,200 | 3.6 |
| Lafayette Parish | 59,900 | 50,330 | 9,500 | 18.9 | 2.79 | 2.90 | 171,000 | 150,017 | 21,000 | 14.0 |
| Lafourche Parish | 28,000 | 25,391 | 2,600 | 10.4 | 3.07 | 3.19 | 87,500 | 82,483 | 5,000 | 6.1 |
| La Salle Parish | 6,400 | 6,069 | 300 | 5.2 | 2.68 | 2.78 | 17,300 | 17,004 | 300 | 1.6 |
| Lincoln Parish | 13,900 | 12,280 | 1,700 | 13.5 | 2.58 | 2.69 | 42,400 | 39,763 | 2,700 | 6.8 |
| Livingston Parish | 23,000 | 18,462 | 4,600 | 24.7 | 3.05 | 3.13 | 71,600 | 58,806 | 12,800 | 21.7 |
| Madison Parish | 5,300 | 5,191 | 100 | 1.8 | 2.90 | 3.04 | 15,600 | 15,975 | -400 | -2.7 |
| Morehouse Parish | 12,600 | 11,611 | 1,000 | 8.8 | 2.86 | 2.95 | 36,800 | 34,803 | 2,000 | 5.6 |
| Natchitoches Parish | 13,700 | 13,257 | 500 | 3.7 | 2.78 | 2.84 | 39,900 | 39,863 | 100 | 0.2 |
| Orleans Parish | 212,800 | 206,435 | 6,300 | 3.1 | 2.56 | 2.63 | 559,000 | 557,515 | 1,500 | 0.3 |
| Ouachita Parish | 51,000 | 47,322 | 3,700 | 7.8 | 2.73 | 2.84 | 144,300 | 139,241 | 5,000 | 3.6 |
| Plaquemines Parish | 8,200 | 7,750 | 400 | 5.5 | 3.17 | 3.27 | 26,600 | 26,049 | 600 | 2.3 |
| Pointe Coupee Parish | 8,200 | 7,703 | 500 | 6.3 | 3.05 | 3.12 | 25,000 | 24,045 | 900 | 3.9 |
| Rapides Parish | 48,200 | 44,759 | 3,400 | 7.6 | 2.76 | 2.89 | 139,200 | 135,282 | 3,900 | 2.9 |
| Red River Parish | 3,600 | 3,514 | 100 | 3.2 | 2.97 | 2.93 | 10,900 | 10,433 | 500 | 4.6 |
| Richland Parish | 8,100 | 7,222 | 900 | 12.7 | 2.80 | 3.00 | 23,400 | 22,187 | 1,200 | 5.6 |
| Sabine Parish | 9,800 | 8,916 | 800 | 9.5 | 2.78 | 2.81 | 27,400 | 25,280 | 2,100 | 8.2 |
| St. Bernard Parish | 23,100 | 20,591 | 2,500 | 12.2 | 2.94 | 3.10 | 68,300 | 64,097 | 4,200 | 6.5 |
| St. Charles Parish | 13,800 | 11,487 | 2,300 | 20.0 | 3.08 | 3.22 | 42,700 | 37,259 | 5,400 | 14.6 |
| St. Helena Parish | 3,400 | 3,072 | 400 | 11.7 | 3.05 | 3.20 | 10,500 | 9,827 | 600 | 6.4 |
| St. James Parish | 6,500 | 6,046 | 500 | 7.9 | 3.42 | 3.54 | 22,400 | 21,495 | 900 | 4.3 |
| St. John the Baptist Parish | 12,200 | 9,305 | 2,900 | 30.9 | 3.31 | 3.42 | 40,500 | 31,924 | 8,500 | 26.8 |
| St. Landry Parish | 29,000 | 26,823 | 2,200 | 8.2 | 3.03 | 3.11 | 88,600 | 84,128 | 4,400 | 5.3 |
| St. Martin Parish | 14,400 | 12,173 | 2,200 | 18.3 | 3.15 | 3.29 | 45,600 | 40,214 | 5,400 | 13.3 |
| St. Mary Parish | 21,000 | 20,040 | 1,000 | 5.0 | 3.05 | 3.18 | 64,700 | 64,253 | 400 | 0.7 |
| St. Tammany Parish | 46,800 | 35,695 | 11,100 | 31.1 | 2.97 | 3.06 | 140,800 | 110,869 | 30,000 | 27.0 |
| Tangipahoa Parish | 30,500 | 25,963 | 4,500 | 17.4 | 2.89 | 2.99 | 91,000 | 80,698 | 10,300 | 12.7 |
| Tensas Parish | 2,900 | 2,938 | -100 | -2.5 | 2.94 | 2.88 | 8,500 | 8,525 | -100 | -0.6 |
| Terrebonne Parish | 33,200 | 29,285 | 3,900 | 13.3 | 3.05 | 3.21 | 101,600 | 94,393 | 7,200 | 7.6 |
| Union Parish | 7,700 | 7,231 | 500 | 6.6 | 2.89 | 2.89 | 22,600 | 21,167 | 1,400 | 6.7 |
| Vermilion Parish | 18,300 | 16,170 | 2,100 | 13.3 | 2.88 | 2.98 | 53,200 | 48,458 | 4,700 | 9.8 |
| Vernon Parish | 17,700 | 15,465 | 2,300 | 14.6 | 2.94 | 3.00 | 60,300 | 53,475 | 6,800 | 12.7 |
| Washington Parish | 16,700 | 15,399 | 1,300 | 8.3 | 2.77 | 2.85 | 47,500 | 44,207 | 3,300 | 7.5 |
| Webster Parish | 17,100 | 15,692 | 1,400 | 8.9 | 2.62 | 2.73 | 45,700 | 43,631 | 2,100 | 4.8 |
| West Baton Rouge Parish | 6,600 | 5,800 | 800 | 14.6 | 3.13 | 3.28 | 20,900 | 19,086 | 1,800 | 9.5 |
| West Carroll Parish | 4,800 | 4,496 | 300 | 5.8 | 2.75 | 2.85 | 13,200 | 12,922 | 300 | 2.1 |
| West Feliciana Parish | 2,500 | 2,313 | 200 | 7.9 | 3.25 | 3.19 | 13,600 | 12,186 | 1,400 | 11.6 |
| Winn Parish | 6,100 | 6,059 | 100 | 1.3 | 2.76 | 2.81 | 17,200 | 17,253 | -100 | -0.6 |
| **Maine** | 432,000 | 395,184 | 36,000 | 9.2 | 2.61 | 2.75 | 1,166,000 | 1,124,660 | 41,000 | 3.6 |
| Androscoggin | 37,200 | 35,233 | 2,000 | 5.6 | 2.61 | 2.73 | 100,900 | 99,657 | 1,200 | 1.2 |
| Aroostook | 30,500 | 29,345 | 1,200 | 4.0 | 2.81 | 3.00 | 88,600 | 91,331 | -2,700 | -3.0 |
| Cumberland | 87,200 | 78,704 | 8,500 | 10.8 | 2.51 | 2.65 | 226,400 | 215,789 | 10,600 | 4.9 |
| Franklin | 10,500 | 9,424 | 1,100 | 11.7 | 2.69 | 2.77 | 29,300 | 27,098 | 2,200 | 8.1 |
| Hancock | 16,800 | 15,442 | 1,400 | 9.0 | 2.51 | 2.62 | 43,600 | 41,781 | 1,800 | 4.3 |

## Table 1. Estimates of Households, for Counties: July 1, 1985—Continued

(A dash (-) represents zero or rounds to zero. Estimates are consistent with special censuses since 1980. Corrections to 1980 census counts are not included. See text concerning rounding and average population per household)

| State and county | Households | | | | Average population per household | | Population | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | July 1, 1985 (estimate) | April 1, 1980 (census) | Change, 1980-85 Number | Change, 1980-85 Percent | July 1, 1985 (esti-mate) | April 1, 1980 (census) | July 1, 1985 (estimate) | April 1, 1980 (census) | Change, 1980-85 Number | Change, 1980-85 Percent |
| **New Jersey—Continued** | | | | | | | | | | |
| Bergen | 310,800 | 300,410 | 10,400 | 3.4 | 2.68 | 2.79 | 839,900 | 845,385 | -5,500 | -0.7 |
| Burlington | 126,600 | 114,890 | 11,700 | 10.2 | 2.86 | 3.01 | 379,800 | 362,542 | 17,300 | 4.8 |
| Camden | 175,300 | 162,508 | 12,800 | 7.9 | 2.76 | 2.88 | 487,200 | 471,650 | 15,500 | 3.3 |
| Cape May | 37,100 | 32,347 | 4,700 | 14.6 | 2.37 | 2.47 | 90,300 | 82,266 | 8,000 | 9.7 |
| Cumberland | 47,400 | 44,287 | 3,100 | 7.1 | 2.75 | 2.91 | 134,800 | 132,866 | 2,000 | 1.5 |
| Essex | 307,300 | 300,303 | 7,000 | 2.3 | 2.71 | 2.79 | 843,900 | 851,116 | -7,200 | -0.8 |
| Gloucester | 71,200 | 65,129 | 6,100 | 9.4 | 2.89 | 3.03 | 208,400 | 199,917 | 8,400 | 4.2 |
| Hudson | 215,500 | 207,857 | 7,700 | 3.7 | 2.56 | 2.65 | 557,000 | 556,972 | 100 | - |
| Hunterdon | 31,700 | 28,515 | 3,100 | 11.0 | 2.87 | 2.98 | 93,600 | 87,361 | 6,200 | 7.1 |
| Mercer | 115,000 | 105,819 | 9,200 | 8.7 | 2.62 | 2.77 | 317,300 | 307,863 | 9,500 | 3.1 |
| Middlesex | 218,500 | 196,708 | 21,800 | 11.1 | 2.77 | 2.93 | 626,800 | 595,893 | 30,900 | 5.2 |
| Monmouth | 189,800 | 170,130 | 19,700 | 11.6 | 2.75 | 2.90 | 531,900 | 503,173 | 28,700 | 5.7 |
| Morris | 142,700 | 131,820 | 10,900 | 8.3 | 2.86 | 3.02 | 417,700 | 407,630 | 10,100 | 2.5 |
| Ocean | 149,900 | 128,304 | 21,600 | 16.8 | 2.52 | 2.67 | 380,800 | 346,038 | 34,700 | 10.0 |
| Passaic | 164,600 | 153,463 | 11,200 | 7.3 | 2.74 | 2.87 | 459,700 | 447,585 | 12,100 | 2.7 |
| Salem | 23,200 | 22,330 | 900 | 4.0 | 2.78 | 2.86 | 65,400 | 64,676 | 800 | 1.2 |
| Somerset | 73,200 | 67,368 | 5,900 | 8.7 | 2.81 | 2.95 | 210,800 | 203,129 | 7,600 | 3.8 |
| Sussex | 41,400 | 37,221 | 4,200 | 11.2 | 2.88 | 3.08 | 121,000 | 116,119 | 4,900 | 4.2 |
| Union | 184,900 | 177,973 | 6,900 | 3.9 | 2.71 | 2.81 | 505,800 | 504,094 | 1,700 | 0.3 |
| Warren | 31,300 | 29,406 | 1,900 | 6.4 | 2.70 | 2.83 | 85,600 | 84,429 | 1,100 | 1.3 |
| **New Mexico** | 510,000 | 441,466 | 68,000 | 15.4 | 2.80 | 2.90 | 1,451,000 | 1,302,894 | 148,000 | 11.4 |
| Bernalillo | 174,400 | 151,037 | 23,300 | 15.4 | 2.63 | 2.74 | 464,400 | 419,700 | 44,700 | 10.7 |
| Catron | 1,000 | 960 | - | -0.5 | 2.77 | 2.78 | 2,700 | 2,720 | - | -0.9 |
| Chaves | 20,700 | 18,194 | 2,500 | 13.9 | 2.65 | 2.73 | 56,100 | 51,103 | 5,000 | 9.9 |
| Cibola | 7,100 | 8,938 | -1,900 | -21.0 | 3.30 | 3.39 | 23,600 | 30,347 | -6,800 | -22.4 |
| Colfax | 5,200 | 4,901 | 300 | 5.4 | 2.68 | 2.73 | 14,200 | 13,667 | 500 | 3.5 |
| Curry | 15,800 | 14,419 | 1,300 | 9.2 | 2.65 | 2.82 | 43,000 | 42,019 | 1,000 | 2.4 |
| De Baca | 1,000 | 989 | - | 0.7 | 2.39 | 2.44 | 2,400 | 2,454 | - | -1.4 |
| Dona Ana | 38,300 | 30,402 | 7,900 | 25.9 | 3.00 | 3.05 | 118,700 | 96,340 | 22,300 | 23.2 |
| Eddy | 18,300 | 16,669 | 1,600 | 9.8 | 2.81 | 2.85 | 51,900 | 47,855 | 4,100 | 8.5 |
| Grant | 9,200 | 8,586 | 600 | 6.9 | 2.88 | 2.99 | 27,000 | 26,204 | 800 | 2.9 |
| Guadalupe | 1,500 | 1,498 | - | -1.1 | 3.00 | 3.00 | 4,400 | 4,496 | -100 | -1.3 |
| Harding | 400 | 412 | - | -12.1 | 2.69 | 2.65 | 1,000 | 1,090 | -100 | -10.6 |
| Hidalgo | 2,100 | 1,905 | 200 | 10.4 | 2.96 | 3.13 | 6,300 | 6,049 | 300 | 4.3 |
| Lea | 21,800 | 18,947 | 2,900 | 15.3 | 2.95 | 2.94 | 64,800 | 55,993 | 8,800 | 15.8 |
| Lincoln | 5,500 | 4,108 | 1,400 | 33.1 | 2.48 | 2.63 | 13,800 | 10,997 | 2,800 | 25.7 |
| Los Alamos | 6,800 | 6,283 | 600 | 8.8 | 2.63 | 2.80 | 18,000 | 17,599 | 400 | 2.1 |
| Luna | 6,700 | 5,557 | 1,100 | 20.5 | 2.60 | 2.78 | 17,600 | 15,585 | 2,000 | 12.8 |
| McKinley | 17,900 | 15,078 | 2,900 | 19.0 | 3.57 | 3.73 | 64,300 | 56,449 | 7,900 | 14.0 |
| Mora | 1,700 | 1,390 | 300 | 19.8 | 2.76 | 3.03 | 4,600 | 4,205 | 400 | 9.5 |
| Otero | 17,200 | 14,608 | 2,600 | 17.8 | 2.80 | 2.95 | 49,900 | 44,665 | 5,200 | 11.7 |
| Quay | 4,400 | 3,936 | 500 | 12.1 | 2.65 | 2.67 | 11,700 | 10,577 | 1,200 | 11.0 |
| Rio Arriba | 10,600 | 9,078 | 1,500 | 16.3 | 3.09 | 3.21 | 32,700 | 29,282 | 3,500 | 11.8 |
| Roosevelt | 6,200 | 5,645 | 600 | 10.7 | 2.45 | 2.58 | 16,600 | 15,695 | 900 | 5.9 |
| Sandoval | 14,600 | 10,464 | 4,200 | 39.8 | 3.20 | 3.30 | 47,100 | 34,799 | 12,300 | 35.4 |
| San Juan | 29,100 | 25,020 | 4,000 | 16.2 | 3.13 | 3.24 | 91,500 | 81,433 | 10,000 | 12.3 |
| San Miguel | 8,300 | 7,370 | 900 | 12.7 | 2.82 | 2.89 | 25,000 | 22,751 | 2,200 | 9.8 |
| Santa Fe | 30,800 | 26,287 | 4,500 | 17.1 | 2.65 | 2.77 | 84,200 | 75,360 | 8,800 | 11.7 |
| Sierra | 4,300 | 3,745 | 600 | 15.5 | 2.15 | 2.25 | 9,300 | 8,454 | 900 | 10.1 |
| Socorro | 4,700 | 4,026 | 700 | 17.0 | 2.93 | 2.99 | 14,300 | 12,566 | 1,700 | 13.7 |
| Taos | 7,600 | 6,470 | 1,200 | 18.2 | 2.86 | 2.99 | 22,000 | 19,456 | 2,500 | 12.9 |
| Torrance | 3,000 | 2,645 | 400 | 15.0 | 2.81 | 2.83 | 8,600 | 7,491 | 1,100 | 14.1 |
| Union | 1,900 | 1,724 | 200 | 11.4 | 2.58 | 2.70 | 5,000 | 4,725 | 300 | 6.4 |
| Valencia | 11,600 | 10,175 | 1,400 | 14.2 | 2.89 | 2.97 | 34,600 | 30,768 | 3,800 | 12.3 |

## Table 1. Estimates of Households, for Counties: July 1, 1985—Continued

(A dash (-) represents zero or rounds to zero. Estimates are consistent with special censuses since 1980. Corrections to 1980 census counts are not included. See text concerning rounding and average population per household)

| State and county | Households | | | | Average population per household | | Population | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | July 1, 1985 (estimate) | April 1, 1980 (census) | Change, 1980-85 | | July 1, 1985 (esti-mate) | April 1, 1980 (census) | July 1, 1985 (estimate) | April 1, 1980 (census) | Change, 1980-85 | |
| | | | Number | Percent | | | | | Number | Percent |
| **Ohio—Continued** | | | | | | | | | | |
| Morrow | 9,200 | 8,773 | 500 | 5.4 | 2.89 | 2.99 | 27,000 | 26,480 | 500 | 2.0 |
| Muskingum | 30,700 | 29,442 | 1,300 | 4.4 | 2.68 | 2.77 | 84,200 | 83,340 | 900 | 1.1 |
| Noble | 4,000 | 3,948 | - | 1.2 | 2.84 | 2.84 | 11,500 | 11,310 | 200 | 1.3 |
| Ottawa | 14,900 | 14,202 | 700 | 5.0 | 2.64 | 2.80 | 39,800 | 40,076 | -300 | -0.7 |
| Paulding | 7,100 | 7,007 | 100 | 1.6 | 2.91 | 3.02 | 20,800 | 21,302 | -500 | -2.2 |
| Perry | 10,800 | 10,525 | 200 | 2.2 | 2.93 | 2.93 | 31,700 | 31,032 | 600 | 2.0 |
| Pickaway | 14,800 | 14,156 | 700 | 4.7 | 2.81 | 2.92 | 45,000 | 43,662 | 1,300 | 3.0 |
| Pike | 8,800 | 7,701 | 1,100 | 14.6 | 2.80 | 2.91 | 25,200 | 22,802 | 2,300 | 10.3 |
| Portage | 45,600 | 44,214 | 1,400 | 3.2 | 2.83 | 2.93 | 136,500 | 135,856 | 700 | 0.5 |
| Preble | 13,700 | 13,122 | 600 | 4.4 | 2.82 | 2.89 | 39,000 | 38,223 | 800 | 2.1 |
| Putnam | 10,600 | 10,110 | 500 | 5.2 | 3.10 | 3.23 | 33,400 | 32,991 | 400 | 1.1 |
| Richland | 47,600 | 46,408 | 1,200 | 2.5 | 2.66 | 2.76 | 129,400 | 131,205 | -1,800 | -1.4 |
| Ross | 23,800 | 22,042 | 1,700 | 7.9 | 2.68 | 2.80 | 67,800 | 65,004 | 2,800 | 4.3 |
| Sandusky | 22,100 | 21,553 | 500 | 2.3 | 2.80 | 2.91 | 62,100 | 63,267 | -1,100 | -1.8 |
| Scioto | 29,600 | 29,534 | 100 | 0.2 | 2.71 | 2.78 | 83,300 | 84,545 | -1,300 | -1.5 |
| Seneca | 21,500 | 20,818 | 700 | 3.2 | 2.79 | 2.88 | 61,900 | 61,901 | - | - |
| Shelby | 14,900 | 14,184 | 700 | 5.0 | 2.90 | 2.99 | 43,800 | 43,089 | 700 | 1.7 |
| Stark | 137,800 | 134,094 | 3,700 | 2.7 | 2.67 | 2.77 | 374,500 | 378,823 | -4,300 | -1.1 |
| Summit | 191,600 | 189,850 | 1,800 | 0.9 | 2.61 | 2.72 | 508,800 | 524,472 | -15,700 | -3.0 |
| Trumbull | 85,800 | 84,151 | 1,600 | 2.0 | 2.72 | 2.85 | 234,800 | 241,863 | -7,100 | -2.9 |
| Tuscarawas | 31,700 | 30,485 | 1,200 | 4.1 | 2.67 | 2.75 | 85,600 | 84,614 | 1,000 | 1.2 |
| Union | 10,700 | 10,015 | 700 | 7.3 | 2.78 | 2.87 | 30,900 | 29,536 | 1,300 | 4.5 |
| Van Wert | 11,000 | 10,939 | 100 | 0.6 | 2.70 | 2.75 | 30,100 | 30,458 | -400 | -1.3 |
| Vinton | 4,000 | 3,924 | 100 | 1.4 | 2.84 | 2.91 | 11,500 | 11,584 | -100 | -0.9 |
| Warren | 33,900 | 31,625 | 2,200 | 7.0 | 2.94 | 3.04 | 103,000 | 99,276 | 3,700 | 3.8 |
| Washington | 22,900 | 22,358 | 500 | 2.4 | 2.75 | 2.81 | 64,500 | 64,266 | 300 | 0.4 |
| Wayne | 34,600 | 32,233 | 2,300 | 7.2 | 2.81 | 2.92 | 100,200 | 97,408 | 2,800 | 2.9 |
| Williams | 13,600 | 12,896 | 700 | 5.4 | 2.67 | 2.79 | 36,600 | 36,369 | 300 | 0.8 |
| Wood | 37,200 | 35,477 | 1,700 | 4.8 | 2.69 | 2.79 | 109,400 | 107,372 | 2,100 | 1.9 |
| Wyandot | 8,000 | 7,838 | 200 | 2.6 | 2.75 | 2.83 | 22,600 | 22,651 | - | -0.1 |
| **Oklahoma** | 1,253,000 | 1,118,561 | 134,000 | 12.0 | 2.56 | 2.62 | 3,306,000 | 3,025,290 | 281,000 | 9.3 |
| Adair | 6,700 | 6,110 | 600 | 9.9 | 2.87 | 2.98 | 19,700 | 18,575 | 1,100 | 6.0 |
| Alfalfa | 2,800 | 2,867 | -100 | -2.6 | 2.41 | 2.38 | 7,000 | 7,077 | -100 | -1.5 |
| Atoka | 4,700 | 4,295 | 400 | 9.9 | 2.71 | 2.73 | 13,900 | 12,748 | 1,200 | 9.3 |
| Beaver | 2,700 | 2,528 | 200 | 8.5 | 2.69 | 2.67 | 7,400 | 6,806 | 600 | 9.2 |
| Beckham | 8,800 | 7,476 | 1,300 | 17.8 | 2.54 | 2.53 | 22,800 | 19,243 | 3,500 | 18.4 |
| Blaine | 5,200 | 5,076 | 200 | 3.2 | 2.59 | 2.59 | 13,900 | 13,443 | 400 | 3.1 |
| Bryan | 12,900 | 11,619 | 1,300 | 11.0 | 2.48 | 2.54 | 32,900 | 30,535 | 2,400 | 7.9 |
| Caddo | 12,400 | 11,069 | 1,300 | 11.8 | 2.65 | 2.72 | 33,700 | 30,905 | 2,800 | 9.1 |
| Canadian | 23,600 | 18,648 | 4,900 | 26.5 | 2.94 | 2.95 | 71,100 | 56,452 | 14,600 | 25.9 |
| Carter | 18,100 | 16,296 | 1,900 | 11.4 | 2.56 | 2.62 | 47,500 | 43,610 | 3,900 | 8.9 |
| Cherokee | 12,100 | 10,595 | 1,500 | 14.5 | 2.65 | 2.73 | 34,400 | 30,684 | 3,700 | 12.0 |
| Choctaw | 6,200 | 6,366 | -100 | -2.0 | 2.59 | 2.67 | 16,300 | 17,203 | -900 | -5.0 |
| Cimarron | 1,600 | 1,379 | 200 | 13.8 | 2.52 | 2.62 | 4,000 | 3,648 | 400 | 9.7 |
| Cleveland | 57,100 | 45,776 | 11,300 | 24.7 | 2.64 | 2.73 | 158,700 | 133,173 | 25,600 | 19.2 |
| Coal | 2,200 | 2,250 | - | -2.2 | 2.69 | 2.66 | 6,000 | 6,041 | -100 | -1.1 |
| Comanche | 40,100 | 35,142 | 5,000 | 14.1 | 2.69 | 2.87 | 120,700 | 112,456 | 8,200 | 7.3 |
| Cotton | 2,700 | 2,829 | -100 | -4.3 | 2.57 | 2.56 | 7,100 | 7,338 | -300 | -3.9 |
| Craig | 5,800 | 5,485 | 300 | 5.2 | 2.53 | 2.59 | 15,400 | 15,014 | 400 | 2.7 |
| Creek | 24,900 | 20,899 | 4,000 | 19.2 | 2.76 | 2.80 | 69,400 | 59,016 | 10,400 | 17.6 |
| Custer | 11,300 | 9,482 | 1,900 | 19.6 | 2.52 | 2.55 | 30,400 | 25,995 | 4,400 | 17.0 |
| Delaware | 10,700 | 8,808 | 1,900 | 21.5 | 2.58 | 2.69 | 27,900 | 23,946 | 3,900 | 16.5 |
| Dewey | 2,500 | 2,303 | 200 | 8.7 | 2.50 | 2.53 | 6,300 | 5,922 | 400 | 7.2 |
| Ellis | 2,300 | 2,222 | 100 | 3.0 | 2.55 | 2.50 | 5,900 | 5,596 | 300 | 5.0 |
| Garfield | 24,900 | 23,844 | 1,100 | 4.6 | 2.50 | 2.55 | 64,400 | 62,820 | 1,600 | 2.5 |

## Table 1. Estimates of Households, for Counties: July 1, 1985—Continued

(A dash (-) represents zero or rounds to zero. Estimates are consistent with special censuses since 1980. Corrections to 1980 census counts are not included. See text concerning rounding and average population per household)

| State and county | Households | | | | Average population per household | | Population | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | July 1, 1985 (estimate) | April 1, 1980 (census) | Change, 1980-85 Number | Change, 1980-85 Percent | July 1, 1985 (esti-mate) | April 1, 1980 (census) | July 1, 1985 (estimate) | April 1, 1980 (census) | Change, 1980-85 Number | Change, 1980-85 Percent |
| **Oklahoma—Continued** | | | | | | | | | | |
| Garvin | 11,400 | 10,511 | 900 | 8.9 | 2.53 | 2.55 | 30,000 | 27,856 | 2,200 | 7.7 |
| Grady | 16,300 | 14,302 | 2,000 | 13.8 | 2.72 | 2.71 | 45,000 | 39,490 | 5,500 | 14.0 |
| Grant | 2,600 | 2,656 | - | -0.8 | 2.48 | 2.41 | 6,600 | 6,518 | 100 | 2.0 |
| Greer | 2,900 | 2,868 | - | 1.2 | 2.26 | 2.28 | 7,000 | 7,028 | - | 0.3 |
| Harmon | 1,800 | 1,758 | - | 1.4 | 2.43 | 2.47 | 4,500 | 4,519 | - | -0.3 |
| Harper | 2,000 | 1,905 | 100 | 3.2 | 2.39 | 2.44 | 4,800 | 4,715 | - | 0.9 |
| Haskell | 4,700 | 4,191 | 500 | 12.5 | 2.51 | 2.61 | 11,900 | 11,010 | 900 | 8.5 |
| Hughes | 5,700 | 5,588 | 100 | 1.9 | 2.54 | 2.53 | 14,700 | 14,338 | 400 | 2.7 |
| Jackson | 11,600 | 10,543 | 1,000 | 9.7 | 2.61 | 2.77 | 31,200 | 30,356 | 800 | 2.8 |
| Jefferson | 3,200 | 3,174 | - | 0.9 | 2.48 | 2.53 | 8,100 | 8,183 | -100 | -0.7 |
| Johnston | 4,200 | 3,831 | 400 | 10.2 | 2.50 | 2.61 | 10,900 | 10,356 | 500 | 5.2 |
| Kay | 20,800 | 19,431 | 1,400 | 7.0 | 2.48 | 2.51 | 52,800 | 49,852 | 2,900 | 5.8 |
| Kingfisher | 5,900 | 5,161 | 700 | 13.5 | 2.73 | 2.72 | 16,100 | 14,187 | 1,900 | 13.6 |
| Kiowa | 5,200 | 5,042 | 100 | 2.4 | 2.41 | 2.48 | 12,700 | 12,711 | - | -0.3 |
| Latimer | 3,700 | 3,398 | 300 | 7.8 | 2.69 | 2.71 | 10,400 | 9,840 | 600 | 5.6 |
| Le Flore | 16,100 | 14,484 | 1,600 | 11.0 | 2.68 | 2.75 | 44,000 | 40,698 | 3,300 | 8.0 |
| Lincoln | 11,000 | 9,649 | 1,400 | 14.4 | 2.70 | 2.73 | 30,100 | 26,601 | 3,500 | 13.2 |
| Logan | 10,700 | 9,414 | 1,300 | 14.2 | 2.72 | 2.70 | 31,100 | 26,881 | 4,200 | 15.6 |
| Love | 3,100 | 2,834 | 300 | 10.7 | 2.54 | 2.64 | 8,000 | 7,469 | 500 | 6.7 |
| McClain | 8,800 | 7,066 | 1,700 | 23.9 | 2.79 | 2.84 | 24,700 | 20,291 | 4,400 | 21.5 |
| McCurtain | 12,800 | 12,366 | 400 | 3.2 | 2.82 | 2.89 | 36,500 | 36,151 | 300 | 0.9 |
| McIntosh | 7,000 | 5,935 | 1,100 | 17.9 | 2.45 | 2.57 | 17,500 | 15,562 | 2,000 | 12.5 |
| Major | 3,500 | 3,272 | 200 | 6.4 | 2.64 | 2.65 | 9,300 | 8,772 | 500 | 6.0 |
| Marshall | 4,600 | 4,158 | 400 | 10.8 | 2.46 | 2.49 | 11,500 | 10,550 | 1,000 | 9.3 |
| Mayes | 12,600 | 11,622 | 1,000 | 8.6 | 2.73 | 2.72 | 35,200 | 32,261 | 2,900 | 9.0 |
| Murray | 4,900 | 4,537 | 400 | 8.2 | 2.55 | 2.57 | 13,100 | 12,147 | 900 | 7.7 |
| Muskogee | 26,500 | 24,736 | 1,700 | 7.1 | 2.60 | 2.64 | 70,600 | 66,939 | 3,700 | 5.5 |
| Noble | 4,500 | 4,348 | 200 | 3.7 | 2.57 | 2.60 | 11,900 | 11,573 | 300 | 2.6 |
| Nowata | 4,300 | 4,327 | -100 | -1.6 | 2.59 | 2.61 | 11,200 | 11,486 | -300 | -2.5 |
| Okfuskee | 4,300 | 4,127 | 200 | 4.3 | 2.63 | 2.62 | 11,700 | 11,125 | 500 | 4.8 |
| Oklahoma | 253,200 | 220,580 | 32,600 | 14.8 | 2.45 | 2.54 | 631,200 | 568,933 | 62,300 | 11.0 |
| Okmulgee | 15,000 | 14,314 | 700 | 4.6 | 2.55 | 2.61 | 40,000 | 39,169 | 800 | 2.1 |
| Osage | 15,100 | 14,382 | 700 | 4.7 | 2.69 | 2.68 | 41,300 | 39,327 | 1,900 | 4.9 |
| Ottawa | 13,100 | 12,244 | 800 | 6.7 | 2.50 | 2.57 | 34,100 | 32,870 | 1,200 | 3.7 |
| Pawnee | 6,400 | 5,745 | 700 | 11.4 | 2.63 | 2.65 | 16,900 | 15,310 | 1,600 | 10.7 |
| Payne | 23,700 | 22,119 | 1,600 | 7.1 | 2.35 | 2.40 | 65,100 | 62,435 | 2,700 | 4.3 |
| Pittsburg | 16,200 | 15,036 | 1,200 | 7.9 | 2.53 | 2.57 | 43,500 | 40,524 | 3,000 | 7.4 |
| Pontotoc | 13,500 | 12,268 | 1,200 | 10.1 | 2.48 | 2.54 | 35,000 | 32,598 | 2,400 | 7.5 |
| Pottawatomie | 22,900 | 20,062 | 2,800 | 14.0 | 2.65 | 2.67 | 62,200 | 55,239 | 6,900 | 12.5 |
| Pushataha | 4,700 | 4,355 | 300 | 7.6 | 2.58 | 2.67 | 12,300 | 11,773 | 500 | 4.1 |
| Roger Mills | 2,000 | 1,769 | 300 | 14.8 | 2.77 | 2.69 | 5,700 | 4,799 | 900 | 18.1 |
| Rogers | 18,900 | 15,650 | 3,300 | 21.0 | 2.88 | 2.94 | 55,200 | 46,436 | 8,700 | 18.8 |
| Seminole | 10,700 | 10,158 | 600 | 5.7 | 2.65 | 2.65 | 29,100 | 27,473 | 1,600 | 6.0 |
| Sequoyah | 12,100 | 10,473 | 1,600 | 15.1 | 2.81 | 2.90 | 34,300 | 30,749 | 3,500 | 11.4 |
| Stephens | 17,200 | 16,512 | 700 | 4.1 | 2.58 | 2.59 | 45,000 | 43,419 | 1,500 | 3.5 |
| Texas | 6,800 | 6,332 | 400 | 6.8 | 2.63 | 2.74 | 18,200 | 17,727 | 500 | 2.7 |
| Tillman | 4,500 | 4,681 | -200 | -3.5 | 2.49 | 2.58 | 11,600 | 12,398 | -800 | -6.5 |
| Tulsa | 205,000 | 181,620 | 23,400 | 12.9 | 2.45 | 2.54 | 512,000 | 470,593 | 41,400 | 8.8 |
| Wagoner | 16,900 | 13,768 | 3,100 | 22.7 | 2.95 | 3.02 | 50,100 | 41,801 | 8,300 | 19.9 |
| Washington | 18,500 | 18,750 | -200 | -1.3 | 2.47 | 2.53 | 46,400 | 48,113 | -1,700 | -3.6 |
| Washita | 5,300 | 5,138 | 200 | 2.9 | 2.63 | 2.64 | 14,200 | 13,798 | 400 | 2.6 |
| Woods | 4,300 | 4,425 | -100 | -2.0 | 2.31 | 2.33 | 10,600 | 10,923 | -300 | -3.0 |
| Woodward | 8,000 | 7,582 | 400 | 5.0 | 2.75 | 2.73 | 22,400 | 21,172 | 1,200 | 5.9 |
| **Oregon** | 1,044,000 | 991,593 | 53,000 | 5.3 | 2.52 | 2.60 | 2,686,000 | 2,633,105 | 53,000 | 2.0 |
| Baker | 6,400 | 6,169 | 200 | 3.6 | 2.45 | 2.58 | 15,900 | 16,134 | -300 | -1.8 |

## Table 1. Estimates of Households, for Counties: July 1, 1985—Continued

(A dash (-) represents zero or rounds to zero. Estimates are consistent with special censuses since 1980. Corrections to 1980 census counts are not included. See text concerning rounding and average population per household)

| State and county | Households | | | | Average population per household | | Population | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | July 1, 1985 (estimate) | April 1, 1980 (census) | Change, 1980-85 | | July 1, 1985 (estimate) | April 1, 1980 (census) | July 1, 1985 (estimate) | April 1, 1980 (census) | Change, 1980-85 | |
| | | | Number | Percent | | | | | Number | Percent |
| **Tennessee—Continued** | | | | | | | | | | |
| Lincoln | 10,000 | 9,533 | 500 | 4.7 | 2.67 | 2.75 | 26,900 | 26,483 | 500 | 1.7 |
| Loudon | 11,300 | 10,289 | 1,000 | 10.2 | 2.65 | 2.75 | 30,400 | 28,553 | 1,800 | 6.4 |
| McMinn | 15,800 | 14,727 | 1,100 | 7.2 | 2.71 | 2.81 | 43,200 | 41,878 | 1,300 | 3.1 |
| McNairy | 8,800 | 8,179 | 700 | 8.1 | 2.63 | 2.73 | 23,400 | 22,525 | 900 | 4.0 |
| Macon | 5,800 | 5,645 | 200 | 3.1 | 2.71 | 2.75 | 15,900 | 15,700 | 200 | 1.4 |
| Madison | 28,900 | 26,713 | 2,200 | 8.2 | 2.61 | 2.71 | 77,800 | 74,546 | 3,200 | 4.3 |
| Marion | 8,800 | 8,270 | 500 | 6.3 | 2.79 | 2.93 | 24,700 | 24,416 | 300 | 1.4 |
| Marshall | 7,600 | 7,144 | 500 | 6.3 | 2.68 | 2.72 | 20,600 | 19,698 | 900 | 4.8 |
| Maury | 19,900 | 18,180 | 1,700 | 9.6 | 2.64 | 2.78 | 53,300 | 51,095 | 2,200 | 4.2 |
| Meigs | 2,700 | 2,520 | 200 | 8.0 | 2.86 | 2.95 | 7,800 | 7,431 | 400 | 4.8 |
| Monroe | 10,500 | 9,637 | 900 | 9.2 | 2.81 | 2.93 | 30,200 | 28,700 | 1,500 | 5.4 |
| Montgomery | 31,600 | 27,198 | 4,400 | 16.1 | 2.67 | 2.87 | 89,800 | 83,342 | 6,500 | 7.8 |
| Moore | 1,800 | 1,534 | 300 | 17.5 | 2.76 | 2.94 | 5,000 | 4,510 | 500 | 10.4 |
| Morgan | 5,800 | 5,389 | 400 | 7.0 | 2.87 | 3.00 | 16,900 | 16,604 | 300 | 2.0 |
| Obion | 12,800 | 12,079 | 800 | 6.4 | 2.57 | 2.70 | 33,200 | 32,781 | 400 | 1.3 |
| Overton | 6,300 | 6,122 | 200 | 3.3 | 2.79 | 2.85 | 17,800 | 17,575 | 200 | 1.4 |
| Perry | 2,600 | 2,240 | 300 | 14.2 | 2.53 | 2.71 | 6,500 | 6,111 | 400 | 6.8 |
| Pickett | 1,600 | 1,542 | 100 | 5.2 | 2.78 | 2.82 | 4,500 | 4,358 | 200 | 3.6 |
| Polk | 4,800 | 4,607 | 100 | 3.2 | 2.86 | 2.95 | 13,700 | 13,602 | - | 0.4 |
| Putnam | 18,600 | 16,706 | 1,900 | 11.5 | 2.50 | 2.65 | 50,700 | 47,690 | 3,000 | 6.2 |
| Rhea | 8,800 | 8,285 | 500 | 6.2 | 2.74 | 2.85 | 24,700 | 24,235 | 500 | 1.9 |
| Roane | 18,300 | 17,078 | 1,200 | 7.3 | 2.70 | 2.82 | 49,700 | 48,425 | 1,300 | 2.7 |
| Robertson | 13,700 | 12,532 | 1,200 | 9.4 | 2.85 | 2.93 | 39,400 | 37,021 | 2,400 | 6.5 |
| Rutherford | 34,100 | 28,002 | 6,100 | 21.9 | 2.74 | 2.84 | 98,600 | 84,058 | 14,600 | 17.3 |
| Scott | 6,900 | 6,200 | 700 | 10.8 | 3.00 | 3.09 | 20,700 | 19,259 | 1,400 | 7.5 |
| Sequatchie | 3,000 | 2,891 | 200 | 5.3 | 2.87 | 2.93 | 8,900 | 8,605 | 300 | 3.1 |
| Sevier | 17,000 | 14,741 | 2,300 | 15.6 | 2.72 | 2.79 | 46,600 | 41,418 | 5,200 | 12.5 |
| Shelby | 291,500 | 269,186 | 22,300 | 8.3 | 2.68 | 2.81 | 803,600 | 777,113 | 26,500 | 3.4 |
| Smith | 5,300 | 5,392 | -100 | -1.5 | 2.72 | 2.76 | 14,500 | 14,935 | -400 | -2.7 |
| Stewart | 3,500 | 3,104 | 400 | 11.3 | 2.68 | 2.79 | 9,300 | 8,665 | 600 | 7.1 |
| Sullivan | 54,600 | 52,022 | 2,600 | 5.0 | 2.64 | 2.75 | 145,600 | 143,968 | 1,600 | 1.1 |
| Sumner | 33,400 | 28,557 | 4,900 | 17.1 | 2.79 | 2.99 | 93,900 | 85,790 | 8,100 | 9.4 |
| Tipton | 12,000 | 10,778 | 1,200 | 11.6 | 2.91 | 3.04 | 35,200 | 32,930 | 2,300 | 6.9 |
| Trousdale | 2,100 | 2,227 | -100 | -4.5 | 2.73 | 2.73 | 5,800 | 6,137 | -300 | -4.7 |
| Unicoi | 6,300 | 5,948 | 300 | 5.1 | 2.68 | 2.74 | 16,900 | 16,362 | 500 | 3.0 |
| Union | 4,300 | 3,947 | 400 | 9.4 | 2.82 | 2.96 | 12,200 | 11,707 | 500 | 4.2 |
| Van Buren | 1,700 | 1,590 | 100 | 6.6 | 2.88 | 2.97 | 4,900 | 4,728 | 200 | 3.4 |
| Warren | 12,700 | 11,869 | 800 | 7.0 | 2.62 | 2.74 | 33,500 | 32,653 | 800 | 2.6 |
| Washington | 33,400 | 31,191 | 2,300 | 7.2 | 2.59 | 2.71 | 92,600 | 88,755 | 3,800 | 4.3 |
| Wayne | 5,100 | 4,792 | 300 | 5.9 | 2.76 | 2.88 | 14,200 | 13,946 | 200 | 1.5 |
| Weakley | 11,600 | 11,567 | - | 0.1 | 2.57 | 2.60 | 33,200 | 32,896 | 300 | 1.0 |
| White | 7,500 | 6,988 | 500 | 7.3 | 2.64 | 2.78 | 19,900 | 19,567 | 300 | 1.7 |
| Williamson | 22,900 | 18,723 | 4,200 | 22.6 | 2.97 | 3.08 | 68,700 | 58,108 | 10,600 | 18.2 |
| Wilson | 21,900 | 18,863 | 3,000 | 16.1 | 2.81 | 2.94 | 62,500 | 56,064 | 6,400 | 11.4 |
| **Texas** | 5,796,000 | 4,929,267 | 867,000 | 17.6 | 2.76 | 2.82 | 16,385,000 | 14,229,191 | 2,156,000 | 15.2 |
| Anderson | 14,300 | 12,386 | 2,000 | 15.8 | 2.70 | 2.70 | 46,800 | 38,381 | 8,500 | 22.1 |
| Andrews | 5,300 | 4,423 | 900 | 19.9 | 3.08 | 2.99 | 16,400 | 13,323 | 3,100 | 23.4 |
| Angelina | 23,700 | 21,781 | 1,900 | 8.7 | 2.84 | 2.88 | 68,700 | 64,172 | 4,600 | 7.1 |
| Aransas | 6,500 | 5,168 | 1,400 | 26.7 | 2.69 | 2.75 | 17,600 | 14,260 | 3,400 | 23.6 |
| Archer | 2,800 | 2,644 | 100 | 5.2 | 2.78 | 2.73 | 7,800 | 7,266 | 500 | 7.2 |
| Armstrong | 700 | 750 | -100 | -8.7 | 2.67 | 2.59 | 1,900 | 1,994 | -100 | -5.8 |
| Atascosa | 9,000 | 8,036 | 1,000 | 12.5 | 3.11 | 3.09 | 28,400 | 25,055 | 3,300 | 13.3 |
| Austin | 7,300 | 6,434 | 900 | 13.4 | 2.80 | 2.71 | 20,800 | 17,726 | 3,000 | 17.1 |
| Bailey | 2,700 | 2,681 | - | -0.2 | 3.06 | 3.02 | 8,300 | 8,168 | 100 | 1.2 |
| Bandera | 3,600 | 2,802 | 800 | 28.3 | 2.46 | 2.48 | 9,000 | 7,084 | 1,900 | 27.1 |

## Table 1. Estimates of Households, for Counties: July 1, 1985—Continued

(A dash (-) represents zero or rounds to zero. Estimates are consistent with special censuses since 1980. Corrections to 1980 census counts are not included. See text concerning rounding and average population per household)

| State and county | Households | | | | Average population per household | | Population | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | July 1, 1985 (estimate) | April 1, 1980 (census) | Change, 1980-85 Number | Change, 1980-85 Percent | July 1, 1985 (estimate) | April 1, 1980 (census) | July 1, 1985 (estimate) | April 1, 1980 (census) | Change, 1980-85 Number | Change, 1980-85 Percent |
| **Texas—Continued** | | | | | | | | | | |
| Bastrop | 12,200 | 8,719 | 3,500 | 39.8 | 2.75 | 2.78 | 34,300 | 24,726 | 9,600 | 38.8 |
| Baylor | 2,100 | 2,027 | - | 2.4 | 2.25 | 2.39 | 4,700 | 4,919 | -200 | -3.7 |
| Bee | 8,700 | 8,181 | 500 | 6.0 | 3.00 | 3.06 | 26,900 | 26,030 | 800 | 3.2 |
| Bell | 63,700 | 52,661 | 11,100 | 21.0 | 2.59 | 2.79 | 174,900 | 157,889 | 17,000 | 10.8 |
| Bexar | 378,300 | 320,639 | 57,600 | 18.0 | 2.92 | 2.98 | 1,139,100 | 988,800 | 150,300 | 15.2 |
| Blanco | 2,200 | 1,825 | 400 | 20.0 | 2.53 | 2.52 | 5,600 | 4,681 | 1,000 | 20.6 |
| Borden | 300 | 299 | - | -1.3 | 2.97 | 2.87 | 900 | 859 | - | 2.0 |
| Bosque | 5,900 | 5,513 | 400 | 6.7 | 2.34 | 2.36 | 14,100 | 13,401 | 700 | 5.5 |
| Bowie | 30,200 | 27,449 | 2,700 | 9.9 | 2.63 | 2.70 | 80,500 | 75,301 | 5,200 | 6.9 |
| Brazoria | 59,900 | 53,907 | 6,000 | 11.1 | 2.99 | 3.00 | 187,200 | 169,587 | 17,600 | 10.4 |
| Brazos | 43,300 | 32,488 | 10,800 | 33.2 | 2.57 | 2.60 | 121,500 | 93,588 | 27,900 | 29.8 |
| Brewster | 2,900 | 2,694 | 200 | 5.8 | 2.60 | 2.63 | 7,900 | 7,573 | 400 | 4.7 |
| Briscoe | 900 | 967 | -100 | -9.0 | 2.59 | 2.67 | 2,300 | 2,579 | -300 | -11.7 |
| Brooks | 2,900 | 2,614 | 300 | 10.3 | 3.16 | 3.20 | 9,200 | 8,428 | 800 | 8.9 |
| Brown | 13,100 | 12,308 | 800 | 6.3 | 2.54 | 2.56 | 34,500 | 33,057 | 1,500 | 4.5 |
| Burleson | 5,300 | 4,459 | 800 | 18.0 | 2.79 | 2.73 | 14,800 | 12,313 | 2,500 | 20.6 |
| Burnet | 8,800 | 6,951 | 1,900 | 26.7 | 2.57 | 2.53 | 22,900 | 17,803 | 5,100 | 28.5 |
| Caldwell | 9,000 | 7,361 | 1,700 | 22.4 | 2.73 | 2.85 | 27,800 | 23,637 | 4,200 | 17.8 |
| Calhoun | 7,500 | 6,469 | 1,000 | 15.7 | 2.86 | 3.01 | 21,600 | 19,574 | 2,000 | 10.2 |
| Callahan | 4,800 | 4,150 | 600 | 15.6 | 2.57 | 2.61 | 12,500 | 10,992 | 1,500 | 13.7 |
| Cameron | 73,900 | 58,418 | 15,500 | 26.6 | 3.37 | 3.56 | 252,000 | 209,727 | 42,300 | 20.2 |
| Camp | 3,700 | 3,404 | 300 | 8.7 | 2.68 | 2.70 | 10,000 | 9,275 | 700 | 7.9 |
| Carson | 2,500 | 2,395 | 100 | 2.9 | 2.72 | 2.73 | 6,800 | 6,672 | 200 | 2.5 |
| Cass | 10,900 | 10,515 | 400 | 4.0 | 2.75 | 2.76 | 30,500 | 29,430 | 1,100 | 3.6 |
| Castro | 3,100 | 3,136 | -100 | -2.6 | 3.36 | 3.34 | 10,300 | 10,556 | -200 | -2.1 |
| Chambers | 6,600 | 6,248 | 400 | 5.8 | 2.96 | 2.96 | 19,600 | 18,538 | 1,100 | 5.9 |
| Cherokee | 14,500 | 13,627 | 900 | 6.4 | 2.63 | 2.67 | 39,700 | 38,127 | 1,500 | 4.0 |
| Childress | 2,600 | 2,776 | -200 | -6.4 | 2.44 | 2.46 | 6,500 | 6,950 | -500 | -7.1 |
| Clay | 3,700 | 3,607 | - | 1.3 | 2.62 | 2.62 | 9,700 | 9,582 | 100 | 1.0 |
| Cochran | 1,400 | 1,515 | -100 | -4.4 | 3.22 | 3.12 | 4,800 | 4,825 | -100 | -1.3 |
| Coke | 1,400 | 1,257 | 200 | 12.2 | 2.42 | 2.47 | 3,500 | 3,196 | 300 | 9.9 |
| Coleman | 4,300 | 4,243 | 100 | 2.5 | 2.35 | 2.41 | 10,400 | 10,439 | - | -0.2 |
| Collin | 65,000 | 46,373 | 18,600 | 40.2 | 2.98 | 3.08 | 195,900 | 144,576 | 51,300 | 35.5 |
| Collingsworth | 1,600 | 1,790 | -200 | -13.4 | 2.54 | 2.56 | 4,000 | 4,648 | -700 | -14.0 |
| Colorado | 7,300 | 6,938 | 400 | 5.4 | 2.71 | 2.67 | 20,200 | 18,823 | 1,300 | 7.2 |
| Comal | 16,800 | 12,958 | 3,800 | 29.5 | 2.74 | 2.77 | 46,600 | 36,446 | 10,100 | 27.8 |
| Comanche | 5,200 | 4,973 | 200 | 4.2 | 2.44 | 2.48 | 12,900 | 12,617 | 300 | 2.3 |
| Concho | 1,000 | 1,091 | -100 | -5.9 | 2.70 | 2.64 | 2,800 | 2,915 | -100 | -3.7 |
| Cooke | 10,500 | 10,078 | 500 | 4.7 | 2.70 | 2.68 | 29,100 | 27,656 | 1,500 | 5.3 |
| Coryell | 14,800 | 14,090 | 700 | 5.1 | 3.04 | 3.06 | 59,300 | 56,767 | 2,500 | 4.5 |
| Cottle | 1,000 | 1,164 | -100 | -12.8 | 2.57 | 2.49 | 2,700 | 2,947 | -300 | -9.9 |
| Crane | 1,700 | 1,552 | 100 | 9.2 | 2.90 | 2.95 | 4,900 | 4,600 | 300 | 7.6 |
| Crockett | 1,600 | 1,558 | 100 | 5.3 | 2.83 | 2.93 | 4,700 | 4,608 | 100 | 1.7 |
| Crosby | 2,900 | 2,920 | - | -0.3 | 2.84 | 3.00 | 8,400 | 8,859 | -500 | -5.7 |
| Culberson | 1,100 | 987 | 100 | 9.5 | 3.11 | 3.35 | 3,400 | 3,315 | 100 | 1.7 |
| Dallam | 2,400 | 2,386 | - | 1.8 | 2.73 | 2.74 | 6,600 | 6,531 | 100 | 1.7 |
| Dallas | 689,600 | 577,701 | 111,900 | 19.4 | 2.57 | 2.66 | 1,794,000 | 1,556,390 | 237,600 | 15.3 |
| Dawson | 5,700 | 5,483 | 300 | 4.8 | 2.81 | 2.93 | 16,300 | 16,184 | 100 | 0.5 |
| Deaf Smith | 6,300 | 6,487 | -200 | -3.2 | 3.18 | 3.24 | 20,100 | 21,165 | -1,100 | -5.1 |
| Delta | 1,900 | 1,932 | - | -1.8 | 2.44 | 2.45 | 4,700 | 4,839 | -100 | -2.2 |
| Denton | 66,700 | 49,134 | 17,500 | 35.7 | 2.72 | 2.77 | 188,700 | 143,126 | 45,600 | 31.8 |
| De Witt | 7,400 | 7,056 | 300 | 4.7 | 2.65 | 2.61 | 20,000 | 18,903 | 1,100 | 5.9 |
| Dickens | 1,200 | 1,369 | -200 | -15.2 | 2.65 | 2.56 | 3,100 | 3,539 | -400 | -12.5 |
| Dimmit | 3,400 | 3,135 | 200 | 6.9 | 3.47 | 3.58 | 11,800 | 11,367 | 400 | 3.5 |
| Donley | 1,600 | 1,608 | - | -2.6 | 2.45 | 2.43 | 4,000 | 4,075 | - | -1.1 |

## Table 1. Estimates of Households, for Counties: July 1, 1985—Continued

(A dash (-) represents zero or rounds to zero. Estimates are consistent with special censuses since 1980. Corrections to 1980 census counts are not included. See text concerning rounding and average population per household)

| State and county | Households | | | | Average population per household | | Population | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | July 1, 1985 (estimate) | April 1, 1980 (census) | Change, 1980-85 | | July 1, 1985 (estimate) | April 1, 1980 (census) | July 1, 1985 (estimate) | April 1, 1980 (census) | Change, 1980-85 | |
| | | | Number | Percent | | | | | Number | Percent |
| **Texas—Continued** | | | | | | | | | | |
| Duval | 3,900 | 3,738 | 200 | 5.4 | 3.35 | 3.30 | 13,400 | 12,517 | 900 | 6.9 |
| Eastland | 8,000 | 7,730 | 300 | 3.5 | 2.43 | 2.39 | 20,500 | 19,480 | 1,000 | 5.1 |
| Ector | 46,900 | 40,450 | 6,400 | 15.9 | 2.84 | 2.83 | 134,100 | 115,374 | 18,700 | 16.2 |
| Edwards | 700 | 697 | - | 4.7 | 2.83 | 2.92 | 2,100 | 2,033 | - | 1.5 |
| Ellis | 25,000 | 19,866 | 5,100 | 25.6 | 2.90 | 2.94 | 73,700 | 59,743 | 13,900 | 23.3 |
| El Paso | 164,100 | 140,806 | 23,300 | 16.5 | 3.26 | 3.32 | 549,900 | 479,899 | 70,000 | 14.6 |
| Erath | 9,900 | 8,699 | 1,200 | 14.4 | 2.36 | 2.44 | 24,900 | 22,560 | 2,300 | 10.2 |
| Falls | 6,800 | 6,920 | -100 | -1.8 | 2.53 | 2.53 | 17,700 | 17,946 | -300 | -1.5 |
| Fannin | 9,300 | 9,267 | 100 | 0.8 | 2.54 | 2.53 | 24,500 | 24,285 | 300 | 1.1 |
| Fayette | 7,900 | 7,487 | 400 | 5.4 | 2.56 | 2.49 | 20,400 | 18,832 | 1,600 | 8.5 |
| Fisher | 2,100 | 2,204 | -100 | -4.7 | 2.67 | 2.62 | 5,700 | 5,891 | -200 | -2.8 |
| Floyd | 3,100 | 3,307 | -200 | -6.4 | 2.88 | 2.95 | 9,000 | 9,834 | -800 | -8.4 |
| Foard | 700 | 860 | -100 | -14.4 | 2.48 | 2.45 | 1,900 | 2,158 | -300 | -13.3 |
| Fort Bend | 57,600 | 39,840 | 17,700 | 44.5 | 3.15 | 3.20 | 186,300 | 130,846 | 55,400 | 42.4 |
| Franklin | 2,700 | 2,616 | 100 | 4.0 | 2.59 | 2.59 | 7,200 | 6,893 | 300 | 4.2 |
| Freestone | 6,400 | 5,608 | 800 | 14.9 | 2.58 | 2.57 | 17,100 | 14,830 | 2,300 | 15.3 |
| Frio | 4,100 | 4,041 | 100 | 1.6 | 3.48 | 3.37 | 14,400 | 13,785 | 600 | 4.6 |
| Gaines | 4,500 | 4,190 | 300 | 8.0 | 3.23 | 3.12 | 14,700 | 13,150 | 1,500 | 11.6 |
| Galveston | 77,400 | 69,284 | 8,100 | 11.7 | 2.72 | 2.79 | 214,000 | 195,940 | 18,000 | 9.2 |
| Garza | 1,900 | 1,842 | 100 | 5.3 | 2.80 | 2.87 | 5,500 | 5,336 | 200 | 3.0 |
| Gillespie | 6,200 | 5,219 | 900 | 18.0 | 2.44 | 2.53 | 15,500 | 13,532 | 1,900 | 14.3 |
| Glasscock | 400 | 387 | - | -9.3 | 3.48 | 3.37 | 1,200 | 1,304 | -100 | -6.3 |
| Goliad | 1,900 | 1,777 | 200 | 8.5 | 2.91 | 2.88 | 5,700 | 5,193 | 500 | 9.4 |
| Gonzales | 6,600 | 5,949 | 600 | 10.9 | 2.78 | 2.78 | 18,700 | 16,883 | 1,800 | 10.8 |
| Gray | 10,500 | 10,224 | 300 | 3.1 | 2.53 | 2.56 | 26,900 | 26,386 | 600 | 2.1 |
| Grayson | 36,800 | 33,972 | 2,800 | 8.4 | 2.56 | 2.58 | 96,900 | 89,796 | 7,100 | 7.9 |
| Gregg | 41,200 | 35,884 | 5,300 | 14.7 | 2.67 | 2.71 | 112,000 | 99,487 | 12,500 | 12.6 |
| Grimes | 5,800 | 4,857 | 1,000 | 20.3 | 2.86 | 2.76 | 19,200 | 13,580 | 5,600 | 41.4 |
| Guadalupe | 19,000 | 15,733 | 3,300 | 21.1 | 2.83 | 2.90 | 55,000 | 46,708 | 8,300 | 17.7 |
| Hale | 12,400 | 12,385 | 100 | 0.5 | 2.91 | 2.97 | 37,000 | 37,592 | -600 | -1.5 |
| Hall | 2,000 | 2,175 | -200 | -7.2 | 2.36 | 2.54 | 4,800 | 5,594 | -800 | -13.5 |
| Hamilton | 3,300 | 3,423 | -200 | -4.7 | 2.34 | 2.35 | 7,900 | 8,297 | -400 | -4.8 |
| Hansford | 2,400 | 2,269 | 100 | 6.0 | 2.71 | 2.73 | 6,500 | 6,209 | 300 | 5.3 |
| Hardeman | 2,400 | 2,476 | -100 | -2.7 | 2.62 | 2.53 | 6,400 | 6,368 | - | 0.5 |
| Hardin | 14,700 | 13,727 | 1,000 | 7.2 | 2.89 | 2.95 | 42,800 | 40,721 | 2,100 | 5.2 |
| Harris | 1,035,800 | 869,882 | 165,900 | 19.1 | 2.67 | 2.75 | 2,784,000 | 2,409,547 | 374,500 | 15.5 |
| Harrison | 19,900 | 18,049 | 1,900 | 10.5 | 2.83 | 2.82 | 57,400 | 52,265 | 5,100 | 9.8 |
| Hartley | 1,300 | 1,361 | -100 | -6.4 | 2.73 | 2.87 | 3,600 | 3,987 | -400 | -11.0 |
| Haskell | 2,900 | 2,981 | -100 | -3.6 | 2.48 | 2.55 | 7,300 | 7,725 | -500 | -6.0 |
| Hays | 18,700 | 12,583 | 6,100 | 48.4 | 2.78 | 2.82 | 56,600 | 40,594 | 16,000 | 39.5 |
| Hemphill | 1,800 | 1,837 | -100 | -3.6 | 2.94 | 2.85 | 5,300 | 5,304 | - | -0.5 |
| Henderson | 20,000 | 16,087 | 3,900 | 24.1 | 2.57 | 2.60 | 52,100 | 42,606 | 9,500 | 22.3 |
| Hidalgo | 99,800 | 75,816 | 23,900 | 31.6 | 3.54 | 3.71 | 355,800 | 283,229 | 72,500 | 25.6 |
| Hill | 10,500 | 9,683 | 900 | 8.9 | 2.52 | 2.52 | 27,300 | 25,024 | 2,200 | 8.9 |
| Hockley | 7,800 | 7,522 | 300 | 4.4 | 3.11 | 3.01 | 25,100 | 23,230 | 1,800 | 7.9 |
| Hood | 9,700 | 6,759 | 2,900 | 43.6 | 2.60 | 2.59 | 25,600 | 17,714 | 7,900 | 44.5 |
| Hopkins | 10,900 | 9,528 | 1,400 | 14.2 | 2.60 | 2.61 | 28,700 | 25,247 | 3,500 | 13.9 |
| Houston | 7,500 | 7,204 | 300 | 4.7 | 2.62 | 2.60 | 22,800 | 22,299 | 500 | 2.2 |
| Howard | 13,300 | 11,965 | 1,400 | 11.4 | 2.62 | 2.68 | 36,100 | 33,142 | 2,900 | 8.8 |
| Hudspeth | 700 | 822 | -100 | -9.9 | 3.41 | 3.30 | 2,500 | 2,728 | -200 | -7.0 |
| Hunt | 24,600 | 20,331 | 4,200 | 20.8 | 2.58 | 2.61 | 65,400 | 55,248 | 10,200 | 18.4 |
| Hutchinson | 10,200 | 9,837 | 300 | 3.4 | 2.72 | 2.64 | 27,900 | 26,304 | 1,600 | 6.2 |
| Irion | 700 | 507 | 200 | 36.8 | 2.82 | 2.73 | 2,000 | 1,386 | 600 | 41.3 |
| Jack | 2,900 | 2,894 | - | -0.1 | 2.61 | 2.53 | 7,600 | 7,408 | 200 | 3.2 |
| Jackson | 4,600 | 4,685 | - | -0.8 | 2.88 | 2.82 | 13,500 | 13,352 | 200 | 1.2 |

## Table 1. Estimates of Households, for Counties: July 1, 1985—Continued

(A dash (-) represents zero or rounds to zero. Estimates are consistent with special censuses since 1980. Corrections to 1980 census counts are not included. See text concerning rounding and average population per household)

| State and county | Households | | | | Average population per household | | Population | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | July 1, 1985 (estimate) | April 1, 1980 (census) | Change, 1980-85 Number | Change, 1980-85 Percent | July 1, 1985 (estimate) | April 1, 1980 (census) | July 1, 1985 (estimate) | April 1, 1980 (census) | Change, 1980-85 Number | Change, 1980-85 Percent |
| **Texas—Continued** | | | | | | | | | | |
| Jasper | 11,100 | 10,708 | 400 | 4.0 | 2.87 | 2.85 | 32,100 | 30,781 | 1,400 | 4.4 |
| Jeff Davis | 600 | 592 | - | 5.9 | 2.79 | 2.75 | 1,800 | 1,647 | 100 | 7.5 |
| Jefferson | 91,700 | 90,245 | 1,500 | 1.6 | 2.71 | 2.73 | 253,300 | 250,938 | 2,400 | 1.0 |
| Jim Hogg | 1,600 | 1,564 | - | 1.9 | 3.41 | 3.30 | 5,400 | 5,168 | 300 | 5.3 |
| Jim Wells | 12,300 | 11,165 | 1,100 | 10.2 | 3.25 | 3.26 | 40,100 | 36,498 | 3,600 | 10.0 |
| Johnson | 29,900 | 23,122 | 6,800 | 29.2 | 2.89 | 2.88 | 87,400 | 67,649 | 19,800 | 29.2 |
| Jones | 6,800 | 6,367 | 400 | 6.4 | 2.62 | 2.66 | 18,100 | 17,268 | 800 | 4.9 |
| Karnes | 4,400 | 4,522 | -100 | -3.2 | 3.00 | 2.96 | 13,300 | 13,593 | -300 | -1.9 |
| Kaufman | 16,700 | 13,154 | 3,500 | 26.9 | 2.84 | 2.83 | 49,200 | 39,015 | 10,100 | 26.0 |
| Kendall | 5,000 | 3,801 | 1,200 | 32.7 | 2.67 | 2.74 | 13,800 | 10,635 | 3,200 | 29.8 |
| Kenedy | 200 | 169 | - | 13.1 | 3.18 | 3.20 | 600 | 543 | 100 | 12.5 |
| Kent | 400 | 431 | - | 1.9 | 2.60 | 2.61 | 1,200 | 1,145 | - | 1.6 |
| Kerr | 13,800 | 11,171 | 2,600 | 23.6 | 2.42 | 2.46 | 34,700 | 28,780 | 6,000 | 20.7 |
| Kimble | 1,700 | 1,564 | 200 | 10.9 | 2.39 | 2.56 | 4,200 | 4,063 | 200 | 3.7 |
| King | 100 | 154 | - | -5.6 | 2.75 | 2.76 | 400 | 425 | - | -5.9 |
| Kinney | 800 | 771 | 100 | 7.9 | 2.90 | 2.96 | 2,400 | 2,279 | 100 | 5.8 |
| Kleberg | 11,000 | 10,280 | 800 | 7.3 | 2.95 | 3.03 | 34,200 | 33,358 | 800 | 2.4 |
| Knox | 2,100 | 2,042 | 100 | 4.5 | 2.52 | 2.55 | 5,500 | 5,329 | 200 | 3.1 |
| Lamar | 16,800 | 15,710 | 1,100 | 6.7 | 2.62 | 2.63 | 44,700 | 42,156 | 2,500 | 6.0 |
| Lamb | 5,800 | 6,408 | -600 | -9.0 | 2.88 | 2.89 | 16,900 | 18,669 | -1,700 | -9.3 |
| Lampasas | 5,400 | 4,414 | 1,000 | 22.9 | 2.50 | 2.68 | 13,800 | 12,005 | 1,800 | 14.8 |
| La Salle | 1,900 | 1,726 | 200 | 11.0 | 2.96 | 3.19 | 5,700 | 5,514 | 200 | 3.0 |
| Lavaca | 6,800 | 7,150 | -400 | -5.0 | 2.66 | 2.61 | 18,400 | 19,004 | -600 | -3.1 |
| Lee | 4,700 | 3,856 | 800 | 21.4 | 2.77 | 2.73 | 13,500 | 10,952 | 2,600 | 23.3 |
| Leon | 4,900 | 3,826 | 1,100 | 29.2 | 2.52 | 2.48 | 12,600 | 9,594 | 3,000 | 31.6 |
| Liberty | 18,600 | 16,227 | 2,400 | 14.9 | 2.88 | 2.88 | 54,100 | 47,088 | 7,000 | 14.8 |
| Limestone | 7,800 | 7,421 | 400 | 5.6 | 2.50 | 2.47 | 21,400 | 20,224 | 1,100 | 5.6 |
| Lipscomb | 1,400 | 1,402 | - | -1.6 | 2.77 | 2.69 | 3,800 | 3,766 | 100 | 1.6 |
| Live Oak | 3,200 | 3,306 | -200 | -4.6 | 2.98 | 2.88 | 9,500 | 9,606 | -100 | -1.4 |
| Llano | 5,300 | 4,402 | 900 | 21.1 | 2.21 | 2.23 | 12,200 | 10,144 | 2,000 | 20.1 |
| Loving | - | 34 | - | -6.6 | 2.74 | 2.68 | 100 | 91 | - | -4.4 |
| Lubbock | 79,100 | 72,627 | 6,500 | 8.9 | 2.69 | 2.76 | 222,500 | 211,651 | 10,900 | 5.1 |
| Lynn | 2,600 | 2,829 | -200 | -6.7 | 2.96 | 3.03 | 7,800 | 8,605 | -800 | -8.9 |
| McCulloch | 3,600 | 3,400 | 200 | 6.7 | 2.47 | 2.51 | 9,200 | 8,735 | 400 | 5.1 |
| McLennan | 67,700 | 61,554 | 6,200 | 10.0 | 2.62 | 2.65 | 185,200 | 170,755 | 14,400 | 8.5 |
| McMullen | 400 | 297 | 100 | 18.5 | 2.74 | 2.66 | 1,000 | 789 | 200 | 22.4 |
| Madison | 3,500 | 3,107 | 400 | 12.2 | 2.66 | 2.65 | 11,800 | 10,649 | 1,200 | 11.1 |
| Marion | 3,700 | 3,874 | -200 | -3.9 | 2.67 | 2.65 | 10,000 | 10,360 | -300 | -3.1 |
| Martin | 1,700 | 1,547 | 200 | 9.8 | 3.08 | 2.99 | 5,300 | 4,684 | 600 | 13.2 |
| Mason | 1,400 | 1,461 | - | -3.3 | 2.48 | 2.47 | 3,600 | 3,683 | -100 | -2.9 |
| Matagorda | 13,800 | 13,110 | 700 | 5.3 | 2.90 | 2.87 | 40,300 | 37,828 | 2,400 | 6.5 |
| Maverick | 8,800 | 7,583 | 1,200 | 15.6 | 4.08 | 4.05 | 36,600 | 31,398 | 5,200 | 16.5 |
| Medina | 8,000 | 7,457 | 600 | 7.8 | 3.08 | 3.06 | 25,100 | 23,164 | 2,000 | 8.5 |
| Menard | 900 | 917 | -100 | -6.3 | 2.60 | 2.52 | 2,300 | 2,346 | -100 | -3.2 |
| Midland | 39,300 | 29,650 | 9,700 | 32.6 | 2.75 | 2.77 | 108,600 | 82,636 | 25,900 | 31.4 |
| Milam | 8,400 | 8,299 | 100 | 1.7 | 2.78 | 2.70 | 23,700 | 22,732 | 1,000 | 4.4 |
| Mills | 1,800 | 1,772 | 100 | 2.9 | 2.40 | 2.43 | 4,600 | 4,477 | 100 | 1.7 |
| Mitchell | 3,300 | 3,304 | - | -1.0 | 2.71 | 2.70 | 9,000 | 9,088 | - | -0.5 |
| Montague | 7,300 | 6,837 | 500 | 6.9 | 2.45 | 2.48 | 18,400 | 17,410 | 1,000 | 5.6 |
| Montgomery | 51,500 | 41,487 | 10,000 | 24.1 | 3.05 | 3.09 | 157,500 | 128,487 | 29,000 | 22.6 |
| Moore | 5,900 | 5,590 | 300 | 4.8 | 2.93 | 2.96 | 17,200 | 16,575 | 700 | 4.0 |
| Morris | 5,200 | 5,187 | - | 0.1 | 2.75 | 2.78 | 14,500 | 14,629 | -100 | -1.0 |
| Motley | 700 | 812 | -100 | -9.1 | 2.34 | 2.40 | 1,700 | 1,950 | -200 | -11.5 |
| Nacogdoche | 18,000 | 16,457 | 1,600 | 9.6 | 2.51 | 2.58 | 50,100 | 46,786 | 3,300 | 7.0 |
| Navarro | 14,700 | 13,331 | 1,400 | 10.5 | 2.59 | 2.59 | 39,200 | 35,323 | 3,900 | 11.0 |
| Newton | 4,500 | 4,470 | 100 | 1.1 | 2.92 | 2.95 | 13,300 | 13,254 | - | 0.2 |

## Table 1. Estimates of Households, for Counties: July 1, 1985—Continued

(A dash (-) represents zero or rounds to zero. Estimates are consistent with special censuses since 1980. Corrections to 1980 census counts are not included. See text concerning rounding and average population per household)

| State and county | Households | | | | Average population per household | | Population | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | July 1, 1985 (estimate) | April 1, 1980 (census) | Change, 1980-85 Number | Change, 1980-85 Percent | July 1, 1985 (estimate) | April 1, 1980 (census) | July 1, 1985 (estimate) | April 1, 1980 (census) | Change, 1980-85 Number | Change, 1980-85 Percent |
| **Texas—Continued** | | | | | | | | | | |
| Nolan | 6,500 | 6,446 | 100 | 0.8 | 2.71 | 2.66 | 17,800 | 17,359 | 400 | 2.6 |
| Nueces | 100,100 | 86,989 | 13,200 | 15.1 | 2.94 | 3.04 | 298,600 | 268,215 | 30,300 | 11.3 |
| Ochiltree | 4,000 | 3,486 | 500 | 14.6 | 2.73 | 2.73 | 11,000 | 9,588 | 1,400 | 14.4 |
| Oldham | 800 | 674 | 100 | 14.4 | 2.60 | 2.80 | 2,500 | 2,283 | 200 | 7.7 |
| Orange | 28,600 | 27,918 | 700 | 2.5 | 2.90 | 2.98 | 83,600 | 83,838 | -200 | -0.3 |
| Palo Pinto | 9,800 | 8,977 | 800 | 8.8 | 2.67 | 2.63 | 26,500 | 24,062 | 2,400 | 10.1 |
| Panola | 7,800 | 7,434 | 300 | 4.5 | 2.80 | 2.74 | 22,100 | 20,724 | 1,300 | 6.4 |
| Parker | 19,900 | 15,640 | 4,300 | 27.4 | 2.80 | 2.81 | 56,500 | 44,609 | 11,900 | 26.6 |
| Parmer | 3,400 | 3,489 | -100 | -1.5 | 3.14 | 3.13 | 10,900 | 11,038 | -200 | -1.4 |
| Pecos | 5,600 | 4,567 | 1,100 | 23.0 | 3.05 | 3.19 | 17,200 | 14,618 | 2,600 | 17.7 |
| Polk | 10,800 | 8,909 | 1,900 | 21.2 | 2.69 | 2.72 | 29,200 | 24,407 | 4,800 | 19.8 |
| Potter | 41,800 | 37,769 | 4,000 | 10.7 | 2.52 | 2.58 | 107,000 | 98,637 | 8,300 | 8.5 |
| Presidio | 1,800 | 1,680 | 100 | 8.5 | 3.08 | 3.08 | 5,600 | 5,188 | 400 | 8.5 |
| Rains | 2,200 | 1,911 | 300 | 15.1 | 2.61 | 2.53 | 5,700 | 4,839 | 900 | 18.5 |
| Randall | 31,200 | 26,709 | 4,500 | 16.9 | 2.72 | 2.73 | 86,700 | 75,062 | 11,700 | 15.5 |
| Reagan | 1,500 | 1,305 | 200 | 16.5 | 3.25 | 3.16 | 5,000 | 4,135 | 800 | 19.7 |
| Real | 1,000 | 900 | 100 | 10.4 | 2.75 | 2.74 | 2,700 | 2,469 | 300 | 10.8 |
| Red River | 5,700 | 6,042 | -300 | -5.7 | 2.70 | 2.62 | 15,700 | 16,101 | -400 | -2.6 |
| Reeves | 5,100 | 4,789 | 300 | 6.1 | 3.10 | 3.26 | 15,900 | 15,801 | 100 | 0.9 |
| Refugio | 3,000 | 3,168 | -100 | -4.2 | 2.81 | 2.91 | 8,600 | 9,289 | -700 | -7.4 |
| Roberts | 400 | 426 | -100 | -16.2 | 2.88 | 2.79 | 1,000 | 1,187 | -200 | -13.5 |
| Robertson | 5,900 | 5,518 | 400 | 6.5 | 2.69 | 2.62 | 16,000 | 14,653 | 1,300 | 9.2 |
| Rockwall | 7,000 | 4,865 | 2,200 | 44.2 | 2.99 | 2.96 | 21,200 | 14,528 | 6,600 | 45.7 |
| Runnels | 4,600 | 4,496 | 100 | 1.8 | 2.69 | 2.61 | 12,500 | 11,872 | 600 | 5.0 |
| Rusk | 15,300 | 15,011 | 300 | 1.9 | 2.77 | 2.71 | 43,000 | 41,382 | 1,600 | 3.9 |
| Sabine | 3,900 | 3,336 | 500 | 16.3 | 2.51 | 2.59 | 9,800 | 8,702 | 1,100 | 13.1 |
| San Augustine | 3,300 | 3,133 | 200 | 6.6 | 2.58 | 2.74 | 8,800 | 8,785 | - | 0.5 |
| San Jacinto | 4,800 | 4,088 | 700 | 17.8 | 2.88 | 2.79 | 13,900 | 11,434 | 2,400 | 21.3 |
| San Patricio | 18,700 | 17,551 | 1,200 | 6.7 | 3.25 | 3.28 | 61,200 | 58,013 | 3,200 | 5.5 |
| San Saba | 2,200 | 2,385 | -200 | -6.6 | 2.48 | 2.54 | 5,700 | 6,204 | -500 | -8.5 |
| Schleicher | 1,100 | 988 | 100 | 10.9 | 2.78 | 2.82 | 3,100 | 2,820 | 300 | 9.3 |
| Scurry | 7,000 | 6,376 | 600 | 9.1 | 2.81 | 2.80 | 19,900 | 18,192 | 1,700 | 9.6 |
| Shackelford | 1,400 | 1,493 | - | -3.0 | 2.66 | 2.58 | 3,900 | 3,915 | - | 0.1 |
| Shelby | 9,000 | 8,555 | 500 | 5.6 | 2.62 | 2.67 | 23,900 | 23,084 | 900 | 3.7 |
| Sherman | 1,200 | 1,117 | 100 | 4.7 | 2.66 | 2.81 | 3,100 | 3,174 | - | -0.8 |
| Smith | 55,300 | 46,042 | 9,200 | 20.0 | 2.67 | 2.73 | 150,500 | 128,366 | 22,200 | 17.3 |
| Somervell | 1,600 | 1,531 | 100 | 4.9 | 2.77 | 2.68 | 4,500 | 4,154 | 300 | 8.3 |
| Starr | 8,900 | 6,858 | 2,100 | 29.9 | 3.84 | 3.94 | 34,500 | 27,266 | 7,200 | 26.5 |
| Stephens | 4,200 | 3,928 | 300 | 6.6 | 2.49 | 2.51 | 10,500 | 9,926 | 600 | 5.6 |
| Sterling | 600 | 413 | 200 | 36.4 | 2.81 | 2.85 | 1,600 | 1,206 | 400 | 34.7 |
| Stonewall | 900 | 941 | - | -5.2 | 2.57 | 2.48 | 2,400 | 2,406 | -100 | -2.3 |
| Sutton | 1,700 | 1,675 | 100 | 3.1 | 3.04 | 3.04 | 5,300 | 5,130 | 200 | 2.9 |
| Swisher | 3,200 | 3,294 | -100 | -4.1 | 2.81 | 2.93 | 8,900 | 9,723 | -800 | -8.0 |
| Tarrant | 388,200 | 310,272 | 77,900 | 25.1 | 2.68 | 2.72 | 1,059,600 | 860,880 | 198,700 | 23.1 |
| Taylor | 44,200 | 38,515 | 5,700 | 14.8 | 2.62 | 2.69 | 122,600 | 110,932 | 11,600 | 10.5 |
| Terrell | 500 | 570 | - | -5.3 | 2.81 | 2.80 | 1,500 | 1,595 | -100 | -4.7 |
| Terry | 5,200 | 4,841 | 300 | 6.5 | 2.94 | 2.98 | 15,300 | 14,581 | 700 | 5.0 |
| Throckmorton | 900 | 853 | - | 5.2 | 2.39 | 2.38 | 2,200 | 2,053 | 100 | 5.5 |
| Titus | 8,500 | 7,740 | 700 | 9.2 | 2.67 | 2.73 | 23,000 | 21,442 | 1,500 | 7.1 |
| Tom Green | 35,400 | 30,369 | 5,100 | 16.7 | 2.64 | 2.67 | 97,500 | 84,784 | 12,700 | 15.0 |
| Travis | 206,700 | 158,432 | 48,300 | 30.5 | 2.48 | 2.53 | 533,700 | 419,573 | 114,100 | 27.2 |
| Trinity | 4,400 | 3,647 | 800 | 21.3 | 2.60 | 2.55 | 11,700 | 9,450 | 2,300 | 23.8 |
| Tyler | 6,700 | 5,870 | 800 | 14.1 | 2.73 | 2.73 | 18,500 | 16,223 | 2,300 | 14.0 |
| Upshur | 11,000 | 10,082 | 1,000 | 9.6 | 2.88 | 2.82 | 32,000 | 28,595 | 3,400 | 12.0 |
| Upton | 1,800 | 1,560 | 300 | 16.3 | 3.04 | 2.95 | 5,500 | 4,619 | 900 | 19.9 |
| Uvalde | 7,900 | 6,960 | 900 | 12.9 | 3.05 | 3.16 | 24,400 | 22,441 | 2,000 | 8.9 |

## Table 1. Estimates of Households, for Counties: July 1, 1985—Continued

(A dash (-) represents zero or rounds to zero. Estimates are consistent with special censuses since 1980. Corrections to 1980 census counts are not included. See text concerning rounding and average population per household)

| State and county | Households | | | | Average population per household | | Population | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | July 1, 1985 (estimate) | April 1, 1980 (census) | Change, 1980-85 | | July 1, 1985 (estimate) | April 1, 1980 (census) | July 1, 1985 (estimate) | April 1, 1980 (census) | Change, 1980-85 | |
| | | | Number | Percent | | | | | Number | Percent |
| **Texas—Continued** | | | | | | | | | | |
| Val Verde | 11,800 | 10,355 | 1,400 | 13.7 | 3.27 | 3.38 | 39,500 | 35,910 | 3,500 | 9.9 |
| Van Zandt | 13,700 | 11,660 | 2,000 | 17.3 | 2.69 | 2.65 | 37,400 | 31,426 | 6,000 | 19.0 |
| Victoria | 24,900 | 22,988 | 1,900 | 8.5 | 2.98 | 2.96 | 75,300 | 68,807 | 6,500 | 9.5 |
| Walker | 15,000 | 11,813 | 3,200 | 27.1 | 2.58 | 2.54 | 51,900 | 41,789 | 10,100 | 24.1 |
| Waller | 7,500 | 5,726 | 1,800 | 30.6 | 2.85 | 2.93 | 23,600 | 19,798 | 3,800 | 19.2 |
| Ward | 5,200 | 4,765 | 500 | 9.6 | 2.98 | 2.90 | 15,800 | 13,976 | 1,800 | 12.7 |
| Washington | 8,900 | 7,817 | 1,000 | 13.3 | 2.68 | 2.62 | 25,400 | 21,998 | 3,400 | 15.6 |
| Webb | 32,200 | 25,896 | 6,300 | 24.5 | 3.63 | 3.79 | 118,400 | 99,258 | 19,100 | 19.3 |
| Wharton | 13,900 | 13,887 | - | 0.1 | 2.94 | 2.86 | 41,400 | 40,242 | 1,200 | 2.9 |
| Wheeler | 2,600 | 2,740 | -100 | -3.7 | 2.67 | 2.58 | 7,100 | 7,137 | - | -0.6 |
| Wichita | 46,400 | 43,134 | 3,300 | 7.6 | 2.56 | 2.63 | 126,600 | 121,082 | 5,600 | 4.6 |
| Wilbarger | 6,200 | 5,983 | 200 | 3.5 | 2.59 | 2.53 | 16,900 | 15,931 | 900 | 5.8 |
| Willacy | 5,400 | 4,760 | 700 | 14.1 | 3.46 | 3.66 | 18,900 | 17,495 | 1,400 | 7.9 |
| Williamson | 35,800 | 24,932 | 10,900 | 43.6 | 2.93 | 3.00 | 107,200 | 76,521 | 30,600 | 40.0 |
| Wilson | 6,100 | 5,429 | 700 | 12.3 | 3.05 | 3.06 | 18,800 | 16,756 | 2,000 | 12.0 |
| Winkler | 3,500 | 3,411 | 100 | 3.1 | 2.99 | 2.90 | 10,600 | 9,944 | 600 | 6.5 |
| Wise | 11,200 | 9,411 | 1,800 | 19.5 | 2.86 | 2.80 | 32,400 | 26,575 | 5,900 | 22.1 |
| Wood | 10,500 | 9,242 | 1,200 | 13.1 | 2.54 | 2.56 | 27,700 | 24,697 | 3,000 | 12.2 |
| Yoakum | 3,100 | 2,700 | 400 | 16.6 | 3.06 | 3.05 | 9,700 | 8,299 | 1,400 | 16.7 |
| Young | 7,300 | 7,361 | - | -0.5 | 2.55 | 2.54 | 19,100 | 19,083 | - | -0.1 |
| Zapata | 2,700 | 2,059 | 600 | 29.9 | 3.12 | 3.22 | 8,300 | 6,628 | 1,700 | 25.8 |
| Zavala | 3,100 | 3,068 | 100 | 2.6 | 3.78 | 3.80 | 11,900 | 11,666 | 200 | 1.9 |
| **Utah** | 505,000 | 448,603 | 57,000 | 12.7 | 3.20 | 3.20 | 1,645,000 | 1,461,037 | 184,000 | 12.6 |
| Beaver | 1,700 | 1,428 | 200 | 17.1 | 3.10 | 3.06 | 5,200 | 4,378 | 800 | 18.6 |
| Box Elder | 10,300 | 9,808 | 500 | 5.2 | 3.44 | 3.31 | 36,300 | 33,222 | 3,000 | 9.2 |
| Cache | 19,700 | 17,558 | 2,100 | 11.9 | 3.18 | 3.16 | 64,600 | 57,176 | 7,500 | 13.1 |
| Carbon | 7,200 | 7,242 | -100 | -1.3 | 3.13 | 3.03 | 22,600 | 22,179 | 400 | 2.0 |
| Daggett | 200 | 244 | - | 1.8 | 3.11 | 3.15 | 800 | 769 | - | 0.4 |
| Davis | 47,200 | 39,994 | 7,200 | 17.9 | 3.64 | 3.58 | 175,100 | 146,540 | 28,600 | 19.5 |
| Duchesne | 4,400 | 3,499 | 900 | 26.9 | 3.42 | 3.57 | 15,300 | 12,565 | 2,700 | 21.6 |
| Emery | 3,300 | 3,276 | - | 0.6 | 3.65 | 3.48 | 12,100 | 11,451 | 600 | 5.3 |
| Garfield | 1,300 | 1,196 | 100 | 6.8 | 3.08 | 3.00 | 4,000 | 3,673 | 300 | 9.4 |
| Grand | 2,500 | 2,759 | -300 | -9.5 | 2.94 | 2.98 | 7,300 | 8,241 | -900 | -10.9 |
| Iron | 5,900 | 5,168 | 800 | 14.7 | 3.23 | 3.28 | 19,800 | 17,349 | 2,400 | 13.9 |
| Juab | 1,800 | 1,707 | 100 | 7.3 | 3.29 | 3.21 | 6,100 | 5,530 | 600 | 10.0 |
| Kane | 1,500 | 1,286 | 200 | 15.5 | 3.10 | 3.12 | 4,600 | 4,024 | 600 | 14.8 |
| Millard | 4,200 | 2,728 | 1,500 | 55.5 | 3.38 | 3.28 | 14,400 | 8,970 | 5,400 | 60.5 |
| Morgan | 1,300 | 1,355 | - | -1.1 | 3.82 | 3.63 | 5,100 | 4,917 | 200 | 4.0 |
| Piute | 500 | 435 | - | 3.7 | 3.21 | 3.06 | 1,400 | 1,329 | 100 | 9.0 |
| Rich | 700 | 654 | - | 5.6 | 3.37 | 3.21 | 2,300 | 2,100 | 200 | 11.0 |
| Salt Lake | 227,400 | 201,742 | 25,700 | 12.7 | 3.01 | 3.03 | 692,700 | 619,066 | 73,700 | 11.9 |
| San Juan | 2,700 | 3,018 | -300 | -9.7 | 4.24 | 4.04 | 11,600 | 12,253 | -600 | -5.3 |
| Sanpete | 4,800 | 4,454 | 400 | 8.4 | 3.34 | 3.17 | 16,700 | 14,620 | 2,100 | 14.0 |
| Sevier | 4,900 | 4,587 | 300 | 5.8 | 3.21 | 3.19 | 15,700 | 14,727 | 1,000 | 6.7 |
| Summit | 4,100 | 3,381 | 700 | 21.2 | 3.04 | 3.02 | 12,400 | 10,198 | 2,200 | 22.0 |
| Tooele | 8,800 | 7,966 | 800 | 10.4 | 3.29 | 3.23 | 29,200 | 26,033 | 3,200 | 12.3 |
| Uintah | 7,200 | 5,949 | 1,200 | 20.8 | 3.49 | 3.44 | 25,100 | 20,506 | 4,600 | 22.3 |
| Utah | 65,400 | 58,515 | 6,800 | 11.7 | 3.53 | 3.59 | 240,100 | 218,106 | 22,000 | 10.1 |
| Wasatch | 2,900 | 2,595 | 300 | 13.3 | 3.28 | 3.26 | 9,700 | 8,523 | 1,200 | 13.8 |
| Washington | 10,500 | 7,801 | 2,700 | 34.1 | 3.29 | 3.28 | 35,200 | 26,065 | 9,200 | 35.1 |
| Wayne | 700 | 615 | - | 6.2 | 3.27 | 3.11 | 2,100 | 1,911 | 200 | 11.7 |
| Weber | 52,500 | 47,643 | 4,900 | 10.2 | 2.96 | 2.99 | 157,400 | 144,616 | 12,800 | 8.9 |
| **Vermont** | 196,000 | 178,325 | 18,000 | 10.1 | 2.62 | 2.75 | 535,000 | 511,456 | 24,000 | 4.6 |
| Addison | 10,400 | 9,380 | 1,000 | 11.2 | 2.79 | 2.91 | 31,400 | 29,406 | 2,000 | 6.9 |

Reference 17

Endangered and Threatened Species of

Texas and Oklahoma 1987

# PREFACE

The Endangered Species Act was passed in 1973 to check the precipitous decline of native fish, wildlife, and plants in the United States. The U.S. Fish and Wildlife Service is charged with determining which species face extinction through man's alteration of their habitat, protecting them from further decline and providing for their continued survival. All Federal agencies are charged with using their authorities to carry out programs for the conservation of endangered species and threatened species and must ensure that any action authorized, funded, or carried out by them does not jeopardize the continued existence of any endangered or threatened species or result in the adverse modification of critical habitat of such species.

This summary of Federally listed endangered and threatened species in Texas and Oklahoma has been compiled by the Albuquerque Regional Office of the U.S. Fish and Wildlife Service. The information provided is for general knowledge only; specific data can be obtained from:

U.S. Fish and Wildlife Service
Office of Endangered Species
P.O. Box 1306
Albuquerque, New Mexico 87103
(505) 766-3972

Ecological Services Field Office
U.S. Fish & Wildlife Service
222 S. Houston, Suite A
Tulsa, Oklahoma 74127
(918) 581-7458

Ecological Services Field Office
U.S. Fish & Wildlife Service
819 Taylor Street, Rm. 9A33
Fort Worth, Texas 76102
(817) 334-2961

Ecological Services Field Office
U.S. Fish & Wildlife Service
c/o Corpus Christi State University
Campus Box 338, 6300 Ocean Drive
Corpus Christi, Texas 78412
(512) 888-3346

Ecological Services Field Office
U.S. Fish & Wildlife Service
17629 E. Camino Real, Suite 211
~~Houston~~, Texas 77058 CLEAR LAKE
~~(713) 229-3682~~
713 750-1700 Julie MASSEY

Only plants and animals that are Federally listed as endangered or threatened species have been included in this summary. In addition to these Federally listed species, Texas Parks and Wildlife Department has a list of rare species which have legal protection within State boundaries, and Oklahoma has a list of rare species. Information regarding State-listed species may be obtained from:

Texas Parks and Wildlife Department
4200 Smith School Road
Austin, Texas 78744
(512) 479-4800

Oklahoma Department of Wildlife Conservation
1801 N. Lincoln, P.O. Box 53465
Oklahoma City, Oklahoma 73152
(405) 521-3851

TEXAS

TABLE OF CONTENTS

BALD EAGLE.....Haliaeetus leucocephalus

STATUS: Endangered (32 FR 4001, March 11, 1967; 43 FR 6233, February 14, 1978) without critical habitat

SPECIES DESCRIPTION: Large eagle with white head and tail in the adult; immatures are dark or mottled. Feet are bare of feathers. Wingspan is 6-7.5 feet.

HABITAT: Bald eagles require large trees or cliffs near water with abundant fish for nesting. They spend the winters along major rivers, reservoirs, or in areas where carrion is available. For nesting eagles, fish are the primary food source. Waterfowl, rabbits, and carrion are also important food items for transient and wintering eagles.

DISTRIBUTION:

Historic: Found throughout the U.S., Canada, and northern Mexico.

Present: Current breeding range has diminished slightly, but most areas remain occupied with fewer breeding pairs. Wintering populations still may occur statewide. Winter concentrations occur around large bodies of water from December through March. Seventeen nesting territories are known in east Texas along rivers, near reservoirs, and along the Gulf Coast.

REASONS FOR DECLINE: Degradation and loss of riparian habitat, pesticide-induced reproductive failure, and human disturbance (including shooting, poisoning and trapping).

OTHER INFORMATION: Southeastern Bald Eagle Recovery Plan approved in 1983. The bald eagle is endangered in all but five of the lower 48 States. In Washington, Oregon, Minnesota, Wisconsin, and Michigan, it is listed as threatened. It is not listed in Alaska, Mexico, or Canada. Nesting populations are gradually increasing in most areas of the country, including Texas.

REFERENCES: Lish 1975, USFWS 1983b, Busch (in press).

# BALD EAGLE

INTERIOR LEAST TERN (Interior population).....*Sterna antillarum*

STATUS: Threatened (50 FR 21784; May 28, 1985) without critical habitat

SPECIES DESCRIPTION: Least terns are small birds with a 20-inch wingspan. Sexes are alike, characterized in the breeding plumage by a black crown, white forehead, grayish back and dorsal wing surfaces, snowy white undersurfaces, orange legs, and a black-tipped yellow bill. Breeding colonies contain from about 5 to 75 nests.

HABITAT: Important characteristics of its breeding habitat include: (1) The presence of bare or nearly bare ground and alluvial islands or sandbars for nesting, (2) the availability of food (primarily small fish), and (3) the existence of favorable water levels during the nesting season (so nests remain above water).

DISTRIBUTION:

Historic: Sand bars on the Colorado (in Texas), Red, Rio Grande, Arkansas, Missouri, Ohio and Mississippi Rivers systems; braided rivers of northwest Oklahoma and southwest Kansas; (salt) flats of northwest Oklahoma (Salt Plains National Wildlife Refuge); mud playa lakes in southeastern New Mexico (Bitter Lakes National Wildlife Refuge).

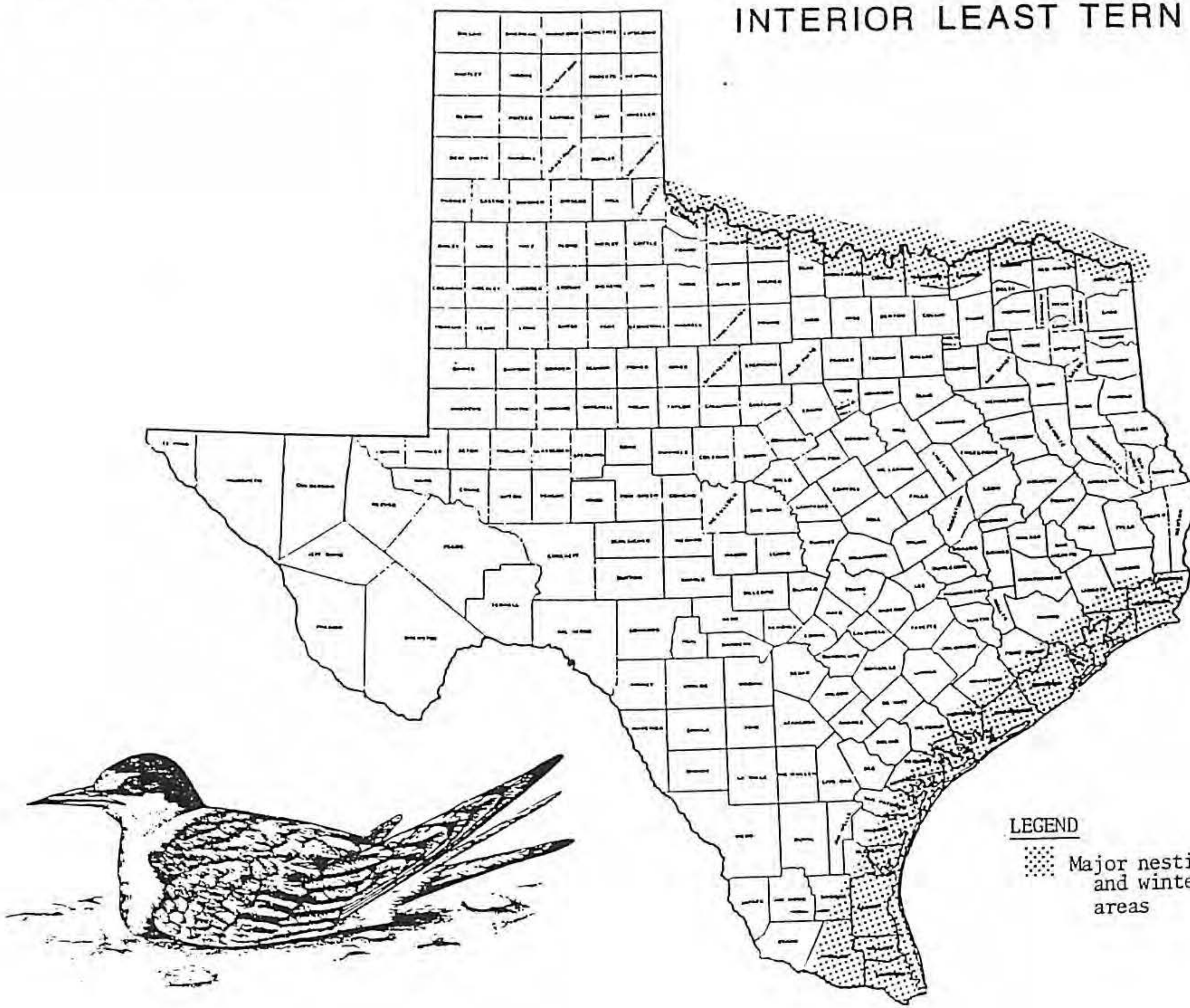
Present: Terns presently occur as small remnant colonies within their historic distribution.

REASONS FOR DECLINE: Many nesting areas have been permanently inundated or destroyed by reservoirs and channelization projects. Alteration of natural river or lake dynamics has caused unfavorable vegetational succession on many remaining islands, curtailing their use as nesting sites by terns. Recreational use of sandbars is a major threat to the tern's reproductive success. Release of reservoir water and annual spring floods often inundate nests.

OTHER INFORMATION: Recovery plan drafted in 1986. The Service is working with the States of New Mexico, Texas, Oklahoma, and the Bureau of Reclamation to monitor tern populations.

REFERENCES: Downing 1980, Ducey 1981, Faanes 1983, USFWS 1986a.

# INTERIOR LEAST TERN



PIPING PLOVER.....*Charadrius melodus*

STATUS: Endangered in the watershed of the Great Lakes, threatened in the remainder of its range (including coastal Texas; 50 FR 50726; December 11, 1985) without critical habitat.

SPECIES DESCRIPTION: A small, stocky shorebird about seven inches long with a wingspan of about 15 inches. Both sexes have pale brownish upper parts and white underparts. A dark band encircling the body below the collar and a dark stripe across the forecrown are distinguishing marks in summer adults, but are obscure in winter.

HABITAT: Nest sites include sandy beaches along the ocean or inland lakes; bare areas on dredge-created and natural alluvial islands in rivers; gravel pits along rivers; and salt-encrusted bare areas of sand, gravel or pebbly mud on interior alkali lakes and ponds. During the winter, piping plovers utilize beaches, sandflats, and dunes along the Gulf Coast and adjacent offshore islands. Spoil islands in intercoastal waterways are also used.

DISTRIBUTION:

*Historic*: Common along the Atlantic and Gulf Coasts, and on the northern Great Plains, the Great Lakes and the Bahamas and West Indies.

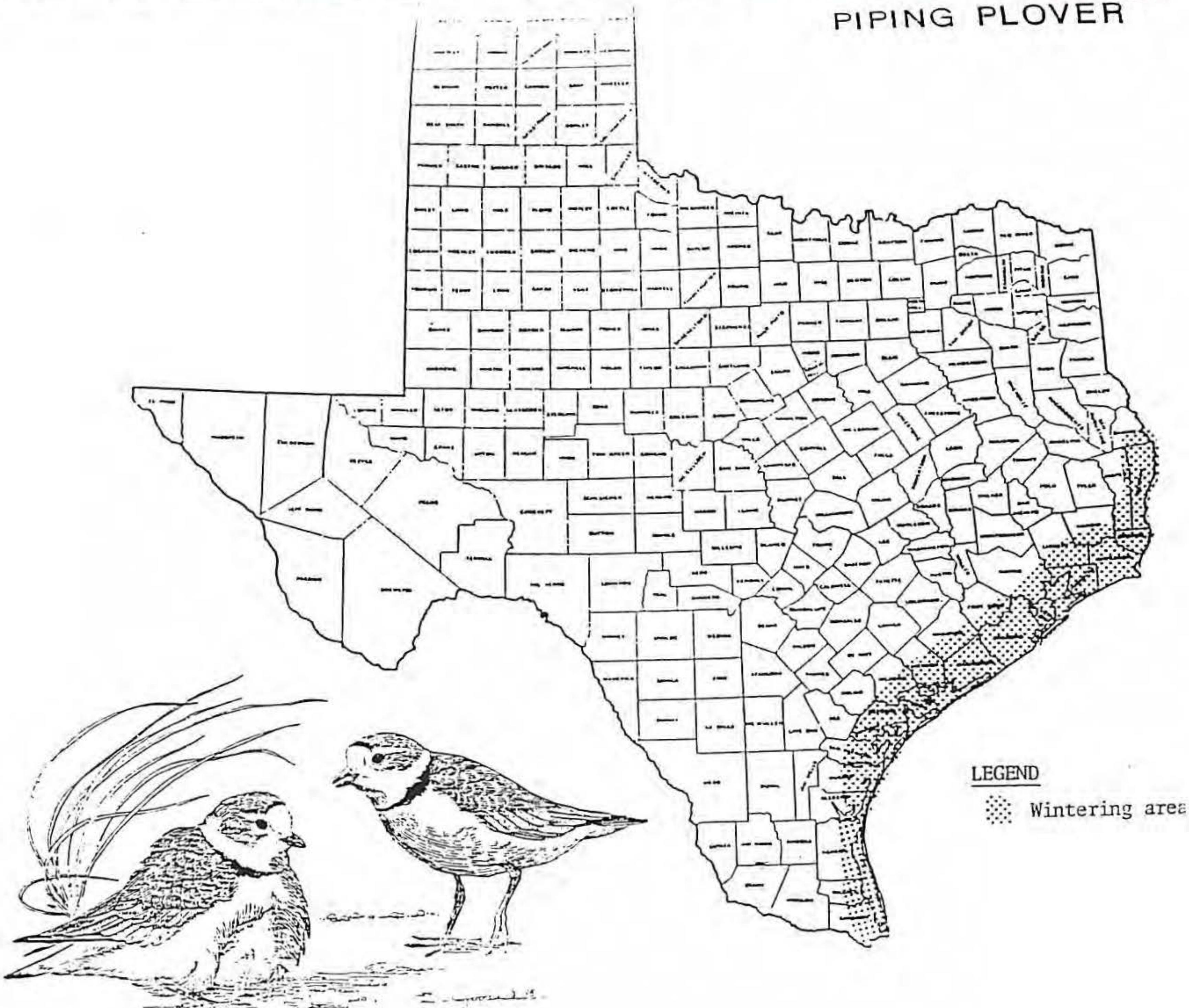
*Present*: Drastically reduced, remnant populations occur throughout historic range.

REASONS FOR DECLINE: Loss or modification of habitat due to commercial, residential, and recreational developments, dune stabilization, damming and channelization of rivers (eliminating sandbars, encroachment of vegetation, and altering water flows), and wetland drainage. Other threats include human disturbance, egg predation by feral pets, and recreational use of habitat.

OTHER INFORMATION: Piping plover recovery plan drafted 1986; recovery team appointed. Listed as endangered by the States of Michigan, Wisconsin, Minnesota, and Iowa, and as threatened by New York, South Dakota, and Nebraska. Survey work is underway and is planned to continue. Conservation efforts have included: research into habitat requirements, predation, and feeding ecology; habitat protection and acquisition; law enforcement; and educational efforts.

REFERENCES: [illegible] and Oring 1985; [illegible] 1986, 1987; USFWS 1986d.

# PIPING PLOVER



WHOOPING CRANE (Rocky Mountain population)....Grus americana
(Wood Buffalo-Aransas Population)

---

STATUS: Endangered (32 FR 4001, March 11, 1967; 35 FR 8495, June 2, 1970) with critical habitat (43 FR 20938, May 15, 1978)

SPECIES DESCRIPTION: The tallest American bird; males approach 5 feet tall. A very large, snowy white, long-necked bird with long legs that normally trail behind in flight, black primary feathers, a red crown, and a wedge-shaped patch of black feathers behind the eye.

HABITAT: Marshes, river bottoms, potholes, prairies, and cropland. Whooping cranes feed on small grains (corn, wheat, sorghum, barley) in agricultural fields, green forage (alfalfa, winter wheat), aquatic plants (tubers and leaves), insects, crustaceans, and small vertebrate animals.

DISTRIBUTION: Breeds in isolated, marshy areas in Wood Buffalo National Park, Northwest Territory, Canada; winters primarily in Aransas and Calhoun Counties, Texas, in marshes, tidal flats, uplands, and barrier islands.

Historic: Originally found over most of North America. In the 19th century the main breeding area was from the Northwest Territory in Canada to the prairie provinces and northern prairie states to Illinois. A nonmigratory flock existed in Louisiana, but is no longer extant. Wintered in the Carolinas, along the Texas Gulf coast, and the high plateaus of central Mexico.

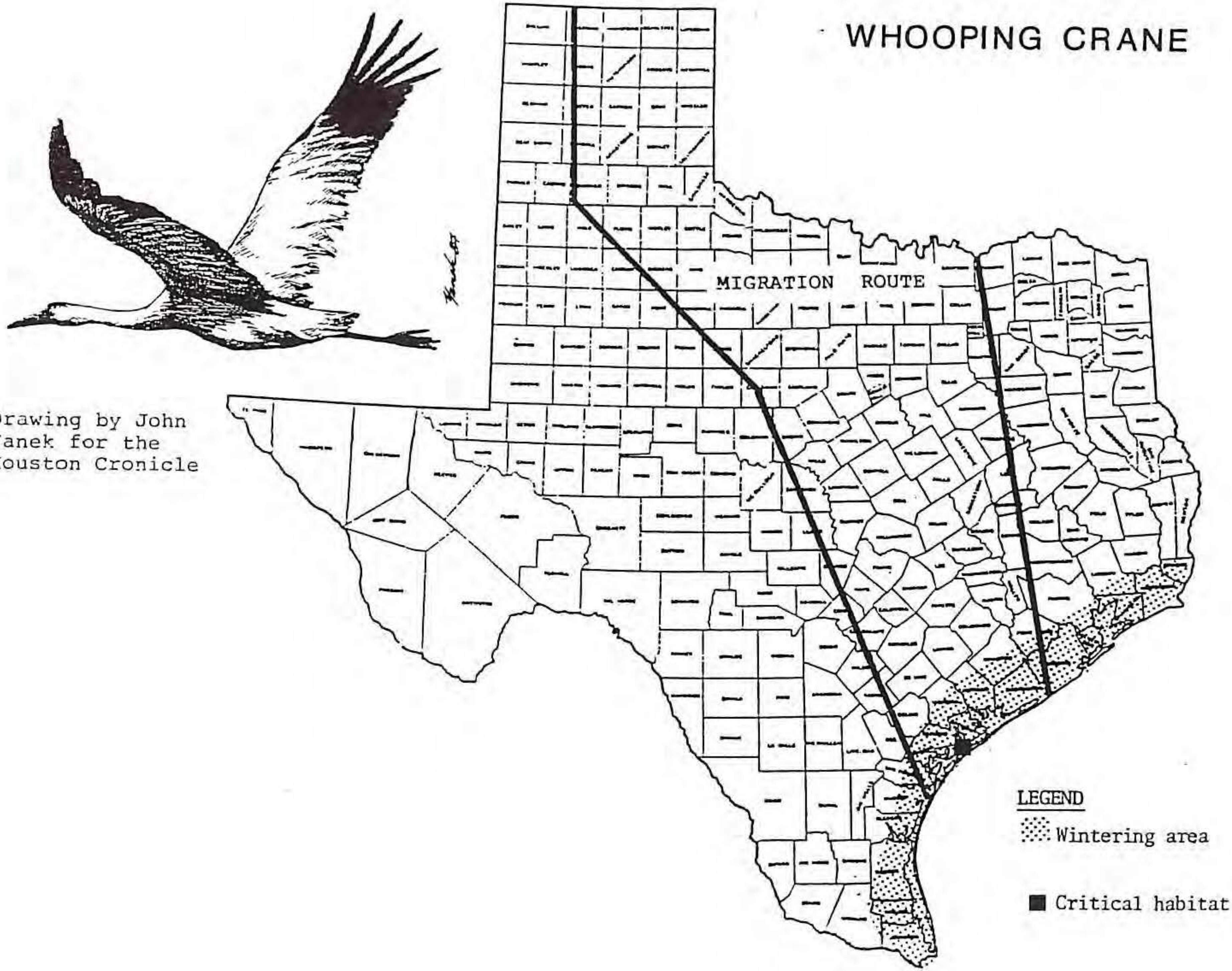
Present: Passes through the central and eastern panhandle of Texas on its migration (October-November in the autumn, April-May in the spring). Migration stopover areas exist in this corridor. Migrate as singles, pairs, family groups (normally three) or in small flocks, sometimes in the company of sandhill cranes. Winters on Aransas National Wildlife Refuge and adjacent areas of the central Texas coast.

REASONS FOR DECLINE: Destruction of wintering and breeding habitat, shooting, collisions with powerlines and fences, specimen collecting, and human disturbance.

OTHER INFORMATION: Recovery team appointed in 1976. Recovery plan published in 1980 and revised in 1986. Protected by Canada and Mexico. Intensive captive-breeding program conducted by the Service and the Canadian Wildlife Service.

REFERENCES: Allen 1952, USFWS 1986b.

# WHOOPING CRANE




Drawing by John Yanek for the Houston Cronicle

AMERICAN ALLIGATOR.....Alligator mississipiensis

STATUS: Reclassified to threatened due to similarity of appearance in Texas on June 20, 1985 (50 FR 25678). Original classification was endangered (32 FR 4001; March 11, 1967) without critical habitat.

SPECIES DESCRIPTION: A large (up to 16 feet) lizard-like reptile with broadly rounded snout. General coloration of adults is grayish-black.

HABITAT: Rivers, bayous, creeks, oxbows, swamps, estuaries, lakes, and marshes.

DISTRIBUTION: Southeastern U.S. from North Carolina to Texas.

Historic: In Texas, from the coastal plain westward to the Balcones Fault line.

Present: Alligators currently occur in more than 90% of their historic range. In Texas, the greatest concentrations occur in the middle and upper coastal counties. Significant populations occur inland in suitable habitat.

REASONS FOR DECLINE: Hunting and destruction of habitat; young are heavily subject to predation and human disturbance.

REFERENCES: Neill 1971, Raun and Gehlbach 1972, USFWS 1973, Conant 1975, Thompson et al 1984.

# AMERICAN ALLIGATOR